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KINGDOM OF BELGIUM

GENERAL NOTES

EM. ROSSEL, EDITOR, BRUSSELS.

et du tra. m. i. .

Ministère de l'Ind. et du tra. m. i. .

KINGDOM OF BELGIUM
DEPARTMENT OF INDUSTRY AND LABOUR.

LOUISIANA PURCHASE EXPOSITION, SAINT-LOUIS, 1904.

BELGIUM,
its Institutions,
Industries and
Commerce.

GENERAL NOTES

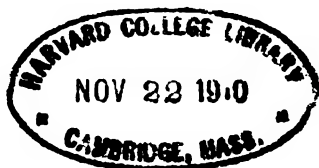
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BRUSSELS. — ÉM. ROSSEL, EDITOR.

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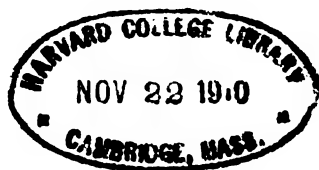


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H. M. KING LEOPOLD II.

H. R. H. THE COUNT OF FLANDERS

H. R. H. THE PRINCE ALBERT OF BELGIUM.

INTRODUCTION.

From the earliest days of its history and under every rule, Belgium has had its own national characteristics. Julius Ceasar acknowledged them and did homage to the military virtues of the Belgians of yore. After the fall of the Roman Empire, the several provinces, forming as many small independent States, whose sovereigns had but ill-defined duties towards the Kings of France and the Holy Empire, lived autonomously and history proclaims their heroic deeds. All of them were moved, sooner than anywhere else, by the spirit of liberty and independence.

Communal franchises and citizens' rights were allowed ever since the xiith century, and were almost the same in the north as in the south; the Kings of Spain as well as the Emperors of Austria swore to respect them, as Dukes of Brabant, Limburg and Luxemburg, Counts of Flanders, Hainault and Namur, when these territories, from a purely personal union, became dependencies of their crown. The Prince-Bishops of Liege, elected by their chapter, governed in freedom during well-nigh ten centuries, nearly a quarter of the territory.

Once already, in the middle of the xvth century, the Dukes of Burgundy, called upon to reign over all these States, accomplished the political unity which, from that time, became the common ideal of all the different parts of the country. The reign of the Archdukes Albert and Isabella witnessed the same, at the beginning of the xviiith century, and these truly national princes lived long in the memory of the people. From that time also great politicians considered the existence of this intermediate

State, whose rich provinces were coveted equally by its two most powerful neighbours and whose plains were oftentimes the battle fields of European armies, as an essential guarantee of peace and political balance. Henry the Fourth and Richelieu conceived and pursued this idea; it was taken up again at the fall of Napoleon by the Statesmen assembled at the Congress of Vienna.

At that time, and with the object of strengthening the *Buffer-State*, Belgium and Holland were united and formed the Kingdom of the Netherlands. But a badly constituted contract made this union difficult and precarious. The revolution of 1830 brought about absolute independence of the country, such as had been proclaimed once, for a short-time, after the first unlucky revolution in 1788, constituting the United Belgian States modelled on the United States of America.

The existence of the Kingdom of Belgium was solemnly acknowledged in 1831 by all the Powers, and the latter adopting the idea of the Congress of Vienna, proclaimed the perpetual neutrality of the new Kingdom. The Powers became its vouchers, but in exchange for this the country bound itself over to defend itself as far as it was able. These duties have been fulfilled to the letter. In 1848 and in 1870, Belgium showed itself deserving the trust of Europe. An army of 175,000 men, protected by first-class fortifications, the original and solid work of the illustrious military engineer Brialmont; proves that in case of a general conflagration, it would be able to impose respect and guard its honor. One cannot doubt it if one bears in mind the valor of the Belgian soldier, proclaimed by so many great captains, supported during long centuries by so many glorious, celebrated names.

The Work accomplished by Belgium since 1830, is in every way remarkable; it may be divided into three different periods :—

The first period was that of political and administrative organization,—it seems to be personified in Charles Rogier, the popular statesman, one of the heads of the Revolution, the minister with wide and fruitful views. This period lasted from 1830 to 1840.

To second was one of economical consolidation, of successful financial reforms and of industrial enterprise throughout the country; to this period the names of Frère-

H. M. KING LEOPOLD I.

Orban and Malou are linked with lasting bonds. This period extended from 1840 to 1880.

The third and last period is that of social reform; it introduced a new electoral system which calls all citizens to the poll and insures, through Proportional Representation, the respect of the rights of minorities. This period is still existing and Mr. Beernaert and Mr. de Smet de Naeyer are its most important representatives.

During these three periods the upward movement has been continuous and general.

All the public services are under an honest and vigilant administration; and this is such a generally recognized fact, that many of its members have been called to foreign lands in order to establish the administrative mechanism on the same footing as in Belgium. Again, members of the Belgian magistracy, which is universally respected, have received in Egypt, and more specially in Siam, the highest charges in the reorganised courts of law.

The State Railway created by Rogier as early as 1835, —at that time the only one on the Continent,—now includes nearly all the lines in the country, and the Government holds one third of the capital in the new and happy combination, which, by associating the Central Powers with the Provinces and Communes, gave birth to the system of Vicinal Light Railways. The former covers at this present time 4500 kilometres, the latter 2500 kilometres; and the water-ways are 2200 kilometres long.

Meanwhile, immense works were being carried out everywhere. The port of Antwerp enfranchised in 1865, thanks to the able diplomacy of Baron Lambermont, is now accessible to vessels drawing nine meters of water, and its quays have been extended to a length of 23 kilom. Its annual imports exceed 16 million tons, and it ranks fourth amongst the principal ports of the world. Zeebrugge will be the unique specimen of an artificial sea-road, in which, at any tide, ships drawing 12 metres can be loaded or unloaded. Ostend, Ghent, Bruges and Brussels are in communication with the sea and are supplied with all the latest improvements. In order to connect the coal-mines of Mons, of the Central country, and of Charleroy, a canal has been cut in which the different levels are overcome by means of four lifts in which

400 ton ships can be raised or lowered. In the immediate neighborhood of Verviers, the dam of the Gileppe, built in 1867, can retain 15 million cubic metres of water; it supplies the works of the region and ensures the good quality of their wares. By means of a pipe line over 65 kilometres long, the river Bocq provides the Brussels suburbs with 500,000 hectolitres per day of excellent, pure water.

All this has been carried out under remarkably elastic financial conditions and first rate credit. The public 3 per cent debt is always at par and sometimes above, and the State Railway lines alone almost form the equivalent. Though the public income since 1831 has risen from 65 million to 650 million francs, the annual tax per head has scarcely increased and does not exceed 34 francs.

Town-dues were abolished in 1860,—tolls on the roads in 1870,—customs, constantly revised in the spirit of free-trade, do not weigh upon the essentials of popular living. The cost of living is scarcely anywhere lower than here, and wages are naturally affected by this. Hence also extremely reduced cost-prices, which facilitate to a high degree commercial and industrial expansion. In this respect, Belgium undoubtedly ranks the highest amongst all the civilized nations, since her annual commercial activity is above 7 thousand million of francs. She is ahead of Austria, Russia, Italy and Spain, and her average per head of population (more than 1,000 francs), places her on the pinnacle of the comparative scales of all the countries on our globe.

The progress in agriculture has done much to maintain cheap living. The cultivation of cereals and all kinds of plants that serve as food is admired by all foreigners, and the division of property, so considerable that there are 1,225,000 land-owners, adds to the perfecting of agriculture, most of the inhabitants in rural-districts working their own property. What splendid pastures are those of the rich Flanders, with their powerful horses, their savoury cattle, and, near Ghent, those universally renowned horticultural nurseries!

Can one be surprised that general well-being should increase under these circumstances?—The Savings-bank guaranteed by the State has issued 2,088,048 depositors' books, of which 1,263,955 are worth less than 100 francs

with a total value of 734,981,144 francs, equal to 100 francs per head of inhabitants. Moreover, 293,407,700 francs have been converted into 74,819 life-annuities books delivered to as many holders, 636,600 pensions have been

CHARLES ROGIER (1800-1885).

allowed. Turning on to the land the current of funds it receives, the Savings-bank has instituted the agricultural credit, and grants considerable loans for the building of workmen's houses, which the State encourages in every

way. An insurance on the life of the borrower gives the necessary guarantee, and also covers the builder's heirs from the risk of a premature death.

A recent law has secured compensation to workmen in case of accidental injuries; another has decreed old-age pensions for the invalid workers, and these pensions are combined with participation in mutual-help societies, which within the last ten years have increased immensely. Soldiers when with the flag, besides their own pay, afford their parents a monthly allowance equal to the sum they brought into the family budget. Workmen's wages are untransferable and not distrainable, and they must be paid down in their workshops in cash. Conflicts between labour and capital are forestalled by boards of arbitration and conciliation, or judged by trade councils, formed, in equal numbers, of masters and workmen.

Hence an average competency, an ever increasing welfare due in a measure also to the excellent organization of the public and private credit. The National bank, free cashier of the State, and regulator of the rate of discount, whose transactions last year were over 37 thousand million of francs,—the Cooperative Union of Credit,—the Communal Credit which facilitates the raising of money needed by the Communes for carrying on the works which fall to their share, the Annuity Office which has consolidated the State payments for the purchase of the railroads,—all these institutions have helped to favor the economical expansion and the prosperity of the land.

The Post-office lends a precious help to Commerce and Industry by the paying of drafts and dividends, by opening its wickets to Savings and Insurances, and by its very low rates.

We have already given the figures of commercial activity; in the notes which will follow, the number of hands, of looms, of engines employed in each industry will be detailed. Belgium, like a busy hive, everywhere and in every direction, strives to produce quickly, well and much. Coal-mines, iron-works, blast-furnaces, steel-works, glass and china works, spinning and weaving mills, fire-arms and engine foundries, railway plant, sugar, food and beverage manufactories, as well as clothing, linen, lace, in short all that modern life comprises

in its most refined and luxurious wants, all is to be found on its small territory, which has thus become equal to countries ten times more extensive.

Together with an unequalled material prosperity, a

FRÈRE-ORBAN (1812-1896).

splendid bursting forth of art and letters has marked the different periods of peace which served to strengthen the national unity. At the court of the Dukes of Burgundy, the brothers Van Eyck and Memling invented painting in

oils, and executed incomparable master-pieces; while Froissart and Comines wrote their admirable chronicles, Van Maerlant rose far above the *trouvères*, and Thierry Martens of Alost rivalled Gutemberg as a printer. During the reign of the Archdukes, Rubens rose to the highest summit of the Flemish school, and Justus Lipsius equalled him in literature; Plantin was the printer in brilliant Antwerp, where Abraham Verhoeven published the first newspaper, while Mercator drew out the earliest geographical projections and Vesalius boldly proclaimed the laws of anatomy. In our days, Leys, Verboekhoven, Verwée, Fourmois to speak only of the dead, took up the scepter of art and established a sort of Renaissance, to which Houzeau, Quetelet, Van Hasselt, Conscience, Clesse and many more contributed in science and literature.

The faith of the ancestors had raised admirable cathedrals, their deep attachment to their free institutions had erected noble belfries and splendid town-halls. Modern generations have brought their share to the fund of monuments and edifices and prove themselves more and more anxious to maintain this capital intact.

The transformation of all the large towns has been generally as felicitous as it has been rapid. What a charming city is Brussels! It is the rival of Paris in elegance and animation, with its belt of sweetly shaded parks and forests. How Liege, Antwerp and Ghent have improved! What museums are the towns of Bruges, Ypres, Tournay and Furnes! Can any watering-place compete with Ostend or Spa? The whole coast has become one long band of charming summer-resorts, and the south of the country, the picturesque Mense and Ardennes regions, attracts and fascinates the tourist and the traveller. Living is simple, easy and cheap everywhere; houses are comfortable, homes calm and happy. Beautiful walks, easy means of conveyance, schools, art-collections, theatres add to its charms. Many operatic master-pieces have been performed for the first time at the Brussels opera-house, and their success ensured. At all periods, music has been held in honor in Belgium. Her singers, her musicians, fill the highest places at the Operas of Paris, Vienna and London, as did formerly Orlando Lasso (Roland de Lattre) at the Court of the Dukes of Bavaria, Hadrian Willaert at that of the Doges of Venice and

Grétry at that of Versailles. The merest villages have their bands of brass or stringed instruments, or their choral societies, which spread amongst the population the love of beauty, and carry afar the renown of the Father-

MR. A. BEERNAERT

land in the competitions where they are constantly successful.

One may say, that the spirit of association reigns nowhere to such a high degree. The number of societies

in Belgium is most considerable, and philanthropy is the aim of many of them. Whether public or private, the work done is marvellous. Charity watches over, prevents and comforts both unfortunate and neglected infancy, old age and the victims of the prevailing deadly tuberculosis, and is patronized with noble heart and mind by the heirs to the throne, the Prince and the Princess Albert.—Striving to fight against the causes, as well as the effects of evils, philanthropy has undertaken an energetic struggle against the terrible enemy, drunkenness. This is one cause of the success of societies for Mutual Help and of the spirit of providence which is so much in accordance with the traditional good sense of the population.

Another distinctive feature of the national character is the sentiment which makes the Belgian so friendly and so hospitable. He opens his doors with as much pleasure as willingness to foreigners who come to visit Belgium; this is the reason why so many International gatherings, Congresses and Conferences of all kinds, have held their sessions here, marking the halting places of humanity on the way towards progress and fraternity. From Brussels was started the first move that opened the Dark Continent to civilization; from Brussels, in 1848, before Europe in arms, eminent men from all countries made the first appeal in favor of arbitration and peace, in answer to the call of Elihu Burritt, an American.

Has Belgium been deaf or indifferent to any noble cause? Has she ever slackened her firm and valiant step? To her also nothing has remained unknown and the improvements in her official or private education, in her scientific and literary societies, supplies her more and more with experienced workers and economical house-keepers, and also with engineers, jurisconsults, and artists ready for the fray.

The Parliament has a share in the education of the people through its debates; and eminent speakers have constantly honored the tribune of the Chambers of deputies as well as that of the Senate. The Press, as free as is education and the conscience of the citizens, serves to spread ideas of progress.

This has been clearly seen in all the Exhibitions in which Belgium has taken part, and in those she has organized: everywhere she has shown herself worthy of the name

given her by a celebrated man : « the great laboratory of the old world's ideas. » The Universal Exhibition of Liege, which will celebrate the 75th anniversary of her independence, will also afford her an opportunity to prove it anew.

BARON LAMBERMONT.

In this ever-progressing march, the part of her Kings has been to guide and direct the progress of the nation. Leopold the First was the true founder of a constitutional monarchy. Surety towards Europe, which inclined to be

distrustful of his young kingdom, he was the prudent and wary pilot steering clear of reefs and commanding respect with affection. As Mentor to the sovereigns of his time, he often filled a part amongst them of which history has not yet told all the salutary influence. Leopold II heir to his father's popular crown, having spent his youth in study and in foreign travel, took up the traditions of his race and appears as an enlightened monarch with wide views, conscious of the wants and ambitions of a busy and industrious people. He long since pointed out the outlets open to the country's activity, and smoothed the way for her. As the Belgians of the xvth century sent their overflowing population and their unrivalled products to the Canary Islands; as those of the xvith started from Antwerp to conquer America, and as those of the xviii, to whom the Scheldt was closed, founded at Ostend the India Company,—thus the King wished the Belgians of to-day to find in Africa, in China and in all other parts of the earth counting houses and works insuring a market for their wares.

The enterprises started and supported by Belgian capital, are more and more numerous abroad, and the list of the pioneers of industry will soon equal that of the missionaries who have carried afar the divine Gospel of Christ, to which they have at times fallen as martyrs.

Growing with the Nation's growth, the Dynasty has become one with it, both in its own eyes and in those of foreigners. Their joys, their griefs, their hopes are all in common, shielded by the free institutions which, as the King has said, « are the most solid foundations of the throne. » May they ever march onwards hand in hand, for the welfare of the country!

GENERAL NOTIONS.

POLITICAL

AND

ADMINISTRATIVE

ORGANIZATION

I. Territory.

General situation : area.
The territory of Belgium affects a shape which resembles as nearly as possible the form of a rectangular triangle of which the sides

The north boundary bordering the North Sea on a length of 67 kilometers and the Low-Countries on an extent of 293 kilometers.

(b) The east boundary bordering the Low-Countries (138 kilometers), Germany (97 kilometers) and the Grand Duchy of Luxemburg (129 kilometers).

(c) The south west boundary which bor-

LEOPOLD I. 'S MONUMENT, LAEKEN.

ders exclusively France, on an extent of 614 kilometers.

The total area of the country is about 2,946,000 hectares. The communes, numbering 2622, are distributed among nine provinces, which are : Antwerp, Brabant, West Flanders, East Flanders, Hainaut, Liege, Limburg, Luxemburg and Namur.

The most extensive province is Luxemburg : 441,785 hectares. The least extensive is Limburg : 241,187 hectares.

The latitude of Brussels, capital of the kingdom, is 56°50'09"75, or 50°51'10"68 (meridian telescope of the

LANDING STAGE ON THE SCHELDT, ANTWERP.

Observatory). Its east longitude, reckoned from the meridian of Paris, is 2°1'56" or 2°2'4"5.

Orography; hypsometry. Considered from the point of view of the relief of the ground, Belgium affects the shape of two inclined planes joined back to back, of which the intersection or apex (crest of the Ardennes) has a general direction from N. E. to S. W., and an altitude which, reaching on one point 678 meters, does hardly ever descend below 400.

The two planes constituting the aera of the country are

inclined the one towards the north the other one towards the south.

The first one includes nearly $\frac{6}{7}$ of the total area of the territory; its inclination is rather slow and regular and ends at the North Sea and the Low-Countries.

The other one descends by a rapid declivity towards the French borders, beyond which it ends at the basin of the Meuse and the Moselle.

Ascending the northern plane from the coast one meets zones which possess their own

VIEW OF THE MEUSE, LIÈGE.

A. *The region of the plains* including :—

1° *The polders*, which cover an area of nearly 115,000 hectares and are generally below the mean level of the sea ;

2° *The low plains*, which are part of the great even and uniform plain extending over all continental Northern Europe from Calais to Russia, along the sea boarders ; they have an area of about 740,000 hectares ;

3° *The table lands*, which occupy the centre of the country and extend themselves from the west eastward, covering an area of about 1,265,500 hectares.

B. *The hilly region* so picturesque and diversified, of

which the subsoil, in some of its parts, is one of the great elements of public wealth; it covers an area of about 825,000 hectares.

Hydrography. The rivers of Belgium belong to the watershed of the North Sea and are included in the three hydrographic basins of the Scheldt, the Meuse and the Yser; a few brooks only belong to the basin of the Rhine and of the Seine.

The basin of the Scheldt, the most extensive one, measures about 1,466,000 hectares; the basin of the Meuse about 1,248,000 hectares.

The basin of the Yser, of little importance, covers approximatively an area of 165,000 hectares.

As far as the basin of the Rhine is concerned, it comprises only 50,000 hectares in Belgium; the basin of the Seine covers a still lesser space, its area in this country covers 16,000 hectares.

II. Climate.

The climate of Belgium is generally temperate.

The atmospheric conditions undergo slight variations according to altitude, as results from the following table which summarises the meteorological observations, made in 1902 on four points of Belgium, which are in the most characteristic situation from the point of view of atmosphere and climate :—

POINTS OF OBSERVATION.	MEAN TEMPERATURE OF THE YEAR.	QUANTITY OF WATER FALLEN DURING THE YEAR.	NUMBER OF DAYS			
			of rain.	of strong frost — 5° and below.	of frost.	of great heat 25° and above.
Observatory of Uccle. (Altitude 100 meters) .	8°8	0 ^m ,716	175	30	63	18
Ostende. (Altitude 7 meters) . . .	9°1	0 ^m ,544	175	22	54	10
Beverloo. (Altitude 50 meters) . .	8°7	0 ^m ,658	176	40	88	36
Arlon. (Altitude 442 meters) .	7°6	0 ^m ,817	189	40	103	30

III. Population.

The number of inhabitants of the kingdom, which reached 3,785,814 in 1831, has not ceased to increase; on December 31st 1900, date of the last general census of the population, it reached 6,693,548, 3,324,834 males and 3,368,714 females. From the most recent statistical calculations this number appears to have been 6,896,079 (or 3,426,587 males and 3,469,492 females), on December 31st 1902, which constitutes an average of 231 inhabitants by the square kilometer.

But the density varies considerably from one province to another; while in Brabant, there are, on an average, 385 inhabitants by the square kilometer, there are only 95 in the province of Namur, and 50 in the province of Luxemburg.

According to the returns of the agricultural census, performed in 1895, the *agricultural* population showed the figure of 1,204,810.

According to the general census of all the inhabitants of the kingdom in 1900, the *industrial* population reached the figure of 1,372,251; and the *commercial* population 385,236.

The number of landowners, capitalists, and of those living on their income or pensions reached 109,419; the number of public officers and servants, including the members of the clergy, the members of the educating body, the army officers and non commissioned officers, and the conscripts serving their time, 125,562.

The small employés, the domestic servants and the workmen, others than those employed in agriculture, industry or commerce, were 677,603 in number.

In the preceeding informations each inhabitant is reckoned as many times, as he exercises different professions.

With regard to persons supposed without any profession or condition, most of them children or old people, they numbered 3,622,247.

It follows from the census of 1900, that, out of the 6,693,548 persons supposed, only 212,474 were born in

foreign countries, but in compensation, according to the returns of the census performed in most civilized countries, more than 500,000 Belgians were at the same time, residing in foreign parts.

With regard to the nationalities, the returns showed the following proportions : on 1000 inhabitants there were in 1900 : 969 Belgians, 8 Germans, 8 Frenchmen, 1 Englishman, 2 Luxemburgers, 9 Dutchmen and 3 citizens of other countries

The number of *emigrants* was in 1902, 23,128 (12,622 born in Belgium; 10,506 born abroad). The number of immigrants was in the same year 29,404 (7839 born in Belgium, and 21,565 born in foreign parts).

There were supposed in 1900 :—

2,574,805	inhabitants speaking french only.		
2,822,005	»	»	flemish »
28,314	»	»	german »
801,587	»	»	french and flemish.

The proportion of the educated, deducting the children aged less than 8 years was :—

59.37	per cent. in 1866
69.37	» » 1880
74.96	» » 1890
80.88	» » 1900

According to the census of 1900 there were, on an average, 503 persons for 100 houses (properly so called), whether inhabited or not, and 117 families for 100 houses (properly so called) whether inhabited or not.

The following informations concern the year 1902.

Number of *births* (not including still-born and other children declared not to have lived) 195,871, whereof 182,304 legitimate, and 13,567 illegitimate (100,330 males and 95,541 females).

Number of recognitions of illegitimate children : 4159.

»	» legitimations	»	» : 8800.
»	» still-born : 8975	(8127 legitimate, 848 illegitimate).	
»	» marriages : 56,157.		
»	» divorces : 703.		
»	» deaths : 119,330	(62,263 males, 57,067 females).	
»	» great naturalisation : 9.		
»	» ordinary »	: 49.	
»	» declarations of indigene	: 1225 (1901).	
»	» authorisations to reside ;	26.	

TABLE SHOWING.

THE INCREASE OF THE POPULATION OF BELGIUM FROM 1836.

YEARS.	POPULATION.	INCREASE.
1836	4,242,598	—
1846(*)	4,337,106	94,598
1856(*)	4,529,560	192,364
1866(*)	4,827,833	298,273
1876(*)	5,336,185	508,352
1880(*)	5,520,009	183,824
1890(*)	6,069,321	549,312
1900(*)	6,693,548	624,227
1901	6,799,999	106,451
1902	6,896,079	96,080

TABLE

SHOWING THE POPULATION AND THE RATE OF BIRTHS, DEATHS, MARRIAGES
AND DIVORCES IN EACH PROVINCE IN 1902.

PROVINCES.	POPULATION.	BIRTHS.	DEATHS.	MARRIAGES.	DIVORCES.
Antwerp.....	852,427	28,142	14,837	7,204	74
Brabant.....	1,318,051	35,524	21,727	11,864	235
West Flanders.....	828,152	28,599	17,257	5,944	16
East Flanders.....	1,066,513	34,352	21,002	7,938	61
Hainaut.....	1,174,418	27,303	18,580	10,126	140
Liège.....	846,066	20,131	12,614	6,944	159
Limburg.....	248,858	9,321	4,297	1,717	1
Luxemburg.....	222,476	5,502	3,468	1,605	5
Namur.....	352,118	7,997	5,548	2,815	12
Kingdom....	16,896,079	195,871	119,330	56,157	703

IV. Belgian Nationality. Constitutional Monarchy.

Belgium has separated itself from the Kingdom of the Low Countries in consequence of the revolution of September 1830; its independence was proclaimed on October 4th by the temporary Government which had assumed the sovereign power, and confirmed on November 18th by

(*) Years in which a new census has taken place,

National Congress elected on the 3rd of the same month.

A few days afterwards on November 22nd, Congress decreed in the name of the Belgian people, that the latter adopted as form of its Government, the representative constitutional monarchy with a hereditary Sovereign.

On June 4th 1831, the same Assembly proclaimed King of the Belgians H. R. H. the prince of Saxe Coburg, who reigned under the name of Leopold the first, until his decease, which happened on December 1865, and was succeeded, from this date, by his eldest son Leopold II. reigning at the present time.

THE CONGRESS COLUMN, BRUSSELS.

The treaty called « of the twenty four articles » enacted in London, on November 15th 1831, between the King of the Belgians, on one part, and the emperors of Austria and of Russia, and the Kings of France, of Great Britain and of Prussia, on the other part, states that Belgium « shall form an independent State, perpetually

neutral and shall be bound to observe this neutrality towards the other States. »

This international treaty accepted by Holland in 1839 has become definite law of the Belgian State.

Our Constitution, one of the freest of the world, emanates from the National Congress; it was promulgated on February 7th 1831 and executed on the 26th of the same month, date of the installation of the Regent, who exercised the executive power, till July 21st, date of the inauguration of Leopold I.

The great liberties which it proclaims, with prohibition of every preventive measure, except of course the repression of misdemeanours committed on occasion of their use, are Liberty of worship, and of its public exercise, and liberty for every one to manifest his opinions in all matters; liberty of association, of teaching and liberty of the Press.

The equality of the citizens before the law is secured, the secrecy of letters is inviolable.

The choice of languages used in Belgium is optional; it cannot be regulated except by law, and only for acts of the public authorities and for judicial business.

Other constitutional dispositions secure, within the limits of the necessities recognised by law, ownership, inviolability of one's house, individual freedom, liberty of meeting peacefully and without arms, &c.

Previous to taking possession of his throne, the King takes the solemn oath « to observe the Constitution and the laws of the Belgian people, to maintain National Independence and the territory's integrity. »

His person is inviolable: his Ministers, appointed by himself are responsible.

The King has a right to convocate the legislative Bodies and to dissolve them.

He commands the forces on land and sea, declares war, makes treatises of peace, alliance and commerce.

He has a right to remit or reduce the penalties to which the judges have sentenced.

Such are the principal constitutional attributes of the Crown.

The Constitution cannot be suspended neither entirely nor by parts. No law neither regulation can infringe it.

It may be revised, when requested by the legislative

Power, but only after a previous dissolution of Parliament. The new Houses cannot deliberate, except when two thirds at least of the members composing each of them are present and no alteration can be adopted, unless it obtain at least two thirds of the votes.

V. Election of the Houses.

The members of the House of Commons (called Chamber of Representatives—*Chambre des représentants*) are elected by the citizens fully aged 25, having their legal

LEGISLATIVE PALACE, BRUSSELS.

residence in the same commune for one year at least. All these electors possess at least one vote. Besides another vote is granted to each elector being father of a family and aged 35, who pays at least five francs for personal tax; and the same to the elector who either owns property of which the cadastral yearly income is not less than 48 francs, or an income of 100 francs.

Two supplementary votes are granted to the possessors

of scientific diplomas and to those who occupy certain positions or exercise certain professions specified by law.

Nobody can cumulate more than three votes.!

Voting is compulsory and takes place in the commune. According to the electoral lists of 1901-1902 there are, for

COUNT DE MERODE-WESTERLOO.
President of the Senate.

the House of Commons 924,379 electors with one vote, 324,970 with two votes, 243,033 with three votes; together 1,492,382 electors with 2,303,418 votes.

The number of the members of the House of Representatives is fixed by law, according to the figure of the popu-

lation. It may not exceed the proportion of one representative for 40,000 inhabitants. There are 166 members since the Act of April 18th 1902 was passed.

To be eligible for the House of Representatives, one has to be a Belgian by birth or by grant of the great naturalisation, to enjoy one's civil and political rights, to be fully aged 25, and to have one's legal residence in Belgium.

The members of the Senate are elected by the citizens, electors for the House of Commons and aged 30 years at least.

According to the electoral lists of 1901-1902, there are for the Senate : 701,603 electors with one vote; 317,669 with two, and 236,627 with three votes; together 1,255,899 electors, disposing of 2,046,822 votes.

Besides the members elected by the so composed Senatorial electors' Body, in the proportion of one Senator by 80,000 inhabitants, the Senate includes the members elected by the provincial Councils, at the rate of two by province having less than 500,000 inhabitants, of three by province having from 500,000 to 1 million inhabitants and of four by province having more than 1 million inhabitants.

The total number of senators is, at the present time 110, of whom 27 are provincial senators.

To be eligible for the Senate, one has to be a Belgian by birth or to have obtained the great naturalisation, to enjoys one's civil and political rights, to have one's legal residence in Belgium, to be fully aged 40; besides one has to pay to the State, at least 1200 francs direct taxes, including the taxes called « *patentes*, » or to be landlord or rent owner of property situate in Belgium, and of which the cadastral income is not less than 12,000 francs. The provincial senators are free from any tax condition.

The number of the eligible for the Senate was 1420 in 1902, which represents a proportion of 1.04 for 5000 inhabitants.

The Belgian electoral laws surround the exercise of the right of voting, with the most precious securities.

The electoral lists are permanent; they are revised every year by the Colleges of burgomasters and sheriffs (*échevins*); recourses against the decisions of these colleges are submitted to the Courts of appeal.

The operations of the ballot are presided and organized by magistrates with the assistance of electors, impartially designated, according to the requirements of the law

and in the presence of witnesses appointed by the parties.

The secrecy of the vote is absolutely secured.

For the legislative elections which are performed by

M. SCHOLLAERT.

President of the Chamber of Representatives.

ballot of list, the Act of December 29th, 1899 has adopted proportional representation. In each district the seats of representatives or senators are distributed between the rival lists, according to the number of votes they have

obtained. This distribution is performed, according to the system invented by the late Mr. Victor D'Hondt, professor at the University of Ghent.

Belgium is the first nation of Europe, which has applied this improvement to the legislative elections.

VI. Legislative Power.

The legislative Power is exercised by the King, the House of Representatives and the Senate.

The initiative belongs to each of the three branches of the legislative power. Nevertheless any law concerning either State receipts or expenses, or the contingent of the army, is to be voted first by the House of Representatives.

Each of the two legislative assemblies appoints its president and constitutes its bureau.

At present, the House of Representatives is presided by Mr. Schollaert, formerly Minister of the Home and Public Education Department.

The Senate is presided by the Count de Merode-Westerloo, formerly Minister of the Foreign Department.

The Ministers have access to both Houses, and must be heard when they request it. The Houses can require the presence of the Ministers. But the Ministers have no deliberative vote in either of the Houses unless they are Members of the said House.

The sittings of the Legislative Houses are public. Laws are freely discussed; no representative or senator can be prosecuted or indicted on account of his opinions or the votes he has emitted in the exercise of his office.

No law may conflict with the Constitution; bating this restriction their province is boundless.

The Acts passed by the House of Representatives and the Senate are sanctioned and promulgated by the King. Bating a formal reservation they are compulsory, on the tenth day after their publication.

VII. Executive Power.

The King, chief of the Executive Power issues the necessary regulations and decrees, for the execution of the laws.

He grants the grades in the army and appoints to the offices of general administration, save the exceptions established by law.

None of his acts can have force, if not countersigned by a Minister who, by this mere act, assumes the responsibility.

The number of Ministerial Departments is at the pre-

COUNT DE SMET DE NAEYER.

Minister of Finances and of Public Works, chief of the Cabinet.

sent time of eight : Home and Public Education ; Finances and Public Works ; Justice ; War ; Agriculture ; Industry and Labour ; Railways, Posts and Telegraphs and Foreign.

The Ministers are the first agents of the Executive Power.

In addition to the central administration which in each Department performs the business, prepares the Ministers' work and executes their decisions, in addition

to the councils and the consultative commissions, and to the inspectors and technical agents, numerous civil service officers connected, according to the nature of their mission, with one or the other Department, cooperate on all points of the country, to secure the working of the services of the general Administration.

The most important of these officers, acting respectively as Government Commissioners in each province, each administrative circonscription and each commune, are the Governors the Circonscription Commissioners (*commissaires d'arrondissement*) and the burgomasters. Specially directed to watch, in their resort, over the maintainance of tranquillity and good order, the security of persons and of property; they are invested with exceptional attributions in the case of public order being threatened.

The Burgomaster is charged with the execution of the laws and regulations of police, in his locality. The other laws and regulations are, except when otherwise stipulated by law, executed by the college of the burgomaster and Sheriffs.

VIII. Judicial Power.

The Judicial Power, independent of the two others, enjoys in the circle of its attributions, absolute independence.

The magistrates who exercise these powers are appointed for life; none can be bereft of his situation nor be suspended except by force of a judgment.

The contests having civil rights for their object, resort exclusively to the judicial authority; those having for their object political rights, resort to the same as well, baring the exceptions foreseen by law, in force of which contentious jurisdictions may be established.

Besides, no extraordinary commission or tribunals may be created, under no denomination whatever.

There is for all Belgium one Court of « Cassation. »

It has no right to cognise the particulars of the case save on one exceptional occasion : when called to use the privilege which Constitution has granted to it, to judge a Minister who is accused.

The councillors of Cassation are appointed by the King,

out of two double lists, presented the one by the Senate, the other by the Court itself.

There are three Courts of appeal : their members are appointed by the King out of two double lists presented the one by the Court, the other by the Provincial Council.

The presidents and vice-presidents of the tribunals of first instance are appointed in the same way, but the judges are freely appointed by the King. There is a Tribunal of *1st. instance* in each of the twenty six judicial circumscriptions of the country.

THE PALACE OF JUSTICE, BRUSSELS.

There is in each district (*canton*) of justice of peace, a tribunal of simple police, and one justice of the peace. The number of judicial districts is 222.

Independently of the fundamental institutions which have been mentioned, there are certain judicatures of a special character exercised by agents whose appointment attributions and rights, are according to Constitution, regulated by law : they are : the military tribunals (Military Court, Councils of war, &c.), the tribunals of Com-

merce of which the Members are elected by an Assembly composed of notable merchants, &c.

Constitution decrees the establishment of a Jury for all criminal matters, and also for political and Press misdemeanours.

The King appoints the officers of the public ministry attached to each Court and Tribunal, in order to watch over the execution of the laws (general procurators and procurators of the King, general advocates, substitutes, &c.) and sheriffs (*greffiers*) as well.

The judicial authority cannot apply general, provincial and local decrees, unless they are conform to law.

PALACE OF JUSTICE, BRUSSELS.

Audiences are public, except when a judgment decrees such publicity dangerous to order or morals.

All decrees or judgments are motived and pronounced in public audience. They are executed in the name of the King.

POLICE.

The laws and regulations on the police have for object to maintain public order, liberty, property and individual security.

In each commune the burgomaster, with the eventual cooperation of the commissioner of police and his assistants, is bound to secure their execution.

Police and security laws bind not only the citizens, but even the foreigners who are accidentally on Belgian territory. The latter may, in certain circumstances stipu-

lated by law, if they compromise public peace, be expelled from the kingdom by administrative measure, and with the intervention of the administrator of public security.

The police is administrative or judicial.

The first has for its object the usual maintenance of public order in all parts of general administration; it tends specially to prevent the perpetration of crimes misdemeanours and contraventions.

The judicial police researches the infractions which the administrative police has been powerless to prevent, gathers the proofs together and puts the repressive tribunals in a position to pronounce with knowledge of the case.

PRISONS.

The prisons are placed under the supervision of administrative commissions or inspection committees which fulfil their office under the Government's authority. Nevertheless the establishments of passage and of municipal police remain more specially under the control of local authorities.

Belgium is the first country of Europe which has applied separate confinement to the penalties depriving of liberty. Since 1835 were built at the prison of Ghent 32 cells according to the type of Philadelphia's Penitentiary. Cellular quarters were erected in succession in the military detention House of Alost and in the reclusion House of Vilvorde; and afterwards in 1844 at the prison of Tongres, and from 1844 to 1860 then other prisons of the cellular type were erected. In 1860 the Central cellular Prison of Louvain was opened. The founder of the penitentiary system in Belgium was an eminent philanthrope Mr. Ducpétiaux (born in 1804, deceased in 1868), general inspector of the prisons and benevolent establishments of the kingdom.

The Act of March 1870 has extended the application of the cellular system and sketched at the same time the rules to follow for the reduction of temporary penalties undergone in solitary confinement, and of which the longest duration is nine years nine months and twelve days. With regard to sentences for life, law does not allow them to be undergone in solitary confinement for a

longer time than ten years, except on request of the prisoner.

The average figure of the population of prisons calculated by day of presence, was in 1900, 751 prisoners in the Central prisons, and 3342 in the secondary prisons. The prisoners are compelled to work according to the kind of penalty they undergo. The proportion of their wages, and the regulations on their reserved capital are the object of special prescriptions of the penal Code.

Besides the prisons intended to receive the indicted detained preventively and the condemned, distinct establishments have been created for children incarcerated by order of the Court or by way of paternal correction. They are the agricultural or benevolent schools and the special Reform Houses. The average population of these special establishments was 2459 in 1900.

Beggars and vagabonds are received in the « Depots » of Mendicity and houses of Refuge. The mean population of these establishments was 5749 in 1900.

These establishments are placed under the supervision and control of a Council of inspection appointed as well as the Director, by the King.

An Act of May 31st 1888 has introduced in Belgium the conditional liberation of prisoners who are not recidivists, and conditional sentences. Private societies have for their object the patronage of discharged prisoners.

IX. Provincial and communal institutions.

The division of Belgium into provinces and communes is not only administrative but, above everything, political.

The province and the commune have their own autonomy, enjoy civil personification, possess distinct interests from those of the State, considered in its whole; they are moral beings who in the organisation of the country are represented by elective councils.

The provincial electors are the same who elect the members for the Senate.

The provincial councils are renewed by halves every four years; they have full right of meeting every year in

ordinary session, to appoint their chairman and constitute their bureau.

A permanent deputation of six members is to be elected by the provincial council in its own body. The Belgian Constitution commits to the provincial councils whatever concerns provincial interests, without interfering with the approval of their acts, in the cases and following the modes prescribed by law.

The permanent Deputation which is the organ and sometimes even the substitute of the Council attends to the daily administration of the interests of the province; law entrusts it, besides, with the control of the administrative and financial management of the Communes, and with nu-

PROVINCIAL GOVERNMENT'S HOTEL, LIÈGE.

merous other attributions concerning the general interests of the country.

The Governor executes the deliberations taken as well by this college as by the provincial council.

To be communal elector, one has to be a Belgian or to have obtained naturalisation and unite the qualifications for the senatorial electorate, excepting the following modifications : (a) legal residence in the commune is required for three years at least; (b) the rate of the tax to which a supplementary vote is attributed is from 5 to 15 francs, according to the populations of the communes; (c) the

elector owning property having a cadastral income of 150 francs at least, enjoys a double supplementary vote.

No one can cumulate more than four votes.

The total number of communal electors is, according

TOWN-HALL OF BRUSSELS.

to the electoral lists 1901-1902, 1,146,482, disposing of 2,007,694 votes.

To be eligible one must be born in Belgium or naturalised, aged 25 and have his legal residence in the commune.

The distribution of the seats between the candidates to the elections, is subject to the following rules :—

The candidates who have obtained more than half the votes are elected. If the number of these candidates is less than the number of mandates to be conferred, the seats still vacant are provided for, according to the relative importance of the number of votes obtained by the different candidates, on the basis of the system of proportional representation. To be admitted to this distribution, a list of candidates must reach a certain *quorum* : one third of the votes if there are less than four members to elect; one fourth, if there are from four to six members to elect, one fifth if there are from seven to twelve members to elect, and one sixth if there are more than twelve members to elect.

The number of communal councillors varies between 7 and 31 by locality according to the figure of its population, and after a legal tabulation.

Besides, supplementary councillors are elected at the rate of four in the communes of 20,000 to 70,000 inhabitants, and of eight in the communes of 70,000 inhabitants and more, half by the electors who are employers and the other half by those who are workmen, and who are at the same time electors for the Council of Industry and Labour.

The communal councillors are elected for eight years. The council is renewed by halves every four years. They meet whenever business requires it, under the presidency of the burgomaster.

In each commune is a College composed of the burgomaster, who presides, and of sheriffs. The latter at the rate of two or four according to the figure of the population are elected by the council among its members. In execution of special laws, there are five sheriffs in a few great towns.

Whatever concerns the communal interests belongs to the attributions of the Communal Council; its regulations must not be in conflict with law, nor with regulations or ordinances of the Provincial Council; its acts may be cancelled if they are illegal or hurtful to general interests: the publicity of its sittings, its budgets and its accounts is compulsory, &c.

The College of burgomaster and sheriffs has like the permanent deputation of the provincial council a twofold

mission to fulfil : as a member of the communal body it is its working agent, attends to its own interests, and secures the execution of the resolutions of the Council; as an organ of the central administration, it exercises numerous attributions, whereof, the most important are the keeping of the registers of Civil-State, and the care of securing in the locality, the execution of the laws, and of the decrees and regulations.

Independently of the establishments which the Communes are authorised to create and which are ruled by them, there are in a certain number of localities public establishments having an existence of their own, enjoying civil personification, having an income, a distinct patrimony from the one belonging to the Commune, and of which the latter limits itself to the control of the management : such are the alms-houses, the benevolent bureaux, and the pawn establishments (*monts-de-piété*).

X. Public Finances.

As stated by the Constitution, bating in the cases formally excepted by law, no retribution, may be exacted from citizens, unless in the shape of a tax for the benefit of the State, Province or Commune. No privilege may be established in the matter of taxes. No exemption or reduction of taxes can be granted except by law.

§ 1. STATE FINANCES.

The taxes for the benefit of the State are voted yearly and the laws which establish them are only valid for one year.

No pension or gratification at the expense of the public Treasury can be granted except in virtue of a law.

Every year the Houses decree the Act of accounts and vote the budget. All receipts and expenses of the State have to be inscribed in the budget and in the accounts. The general account of the receipts and expenses of the State is submitted to the Houses with the remarks of the Courts of accounts.

To this Court of which the members, eight in number, are appointed by the House of Representatives, is committed the examination and the liquidation of the accounts of the general administration and of all who have to account to the public Treasury; it takes care that no article of the

expenses of the Budget should exceed its figure and that no transfer should take place.

The National Bank, cashier of the State, receives in all its agencies the deposits and performs the payments on account of the Treasury; besides, it attends to the service and the keeping of the public funds, the reception of certificates of the public debt, &c.

The ordinary receipts are yearly foreseen in the budget of *ways and means*. The ordinary expenses are foreseen in the different budgets mentioned hereafter. There is a distinct budget of *extraordinary receipts and expenses* and another of a special character, called budget of *receipts and expenses « by order »* which includes all funds which are strange to the State but, whereof the Public Treasury has to effectuate the receipt and the repaying.

The amount of receipts and expenses was as follows in 1900 :—

RECEIPTS.

ORDINARY RESOURCES (*budget of ways and means*).

Taxes	fr. 234,718,362
Tolls	232,691,836
Capitals and incomes	21,407,639
Repayments	5,287,936
	<hr/>
Total.	fr. 494,105,773
Extraordinary and special resources	48,672,331
	<hr/>
General total.	fr. 542,778,104

EXPENSES.

ORDINARY SERVICES.

Budget of the Public Debt.	. . . . .	fr.	128,555,565
Budget of Dotations.	. . . . .		5,070,880
Budget of Justice.	. . . . .		25,949,002
Budget of the Foreign Department	. . . . .		3,571,862
Budget of the Home and Public Education Department	. . . . .		29,333,833
Budget of Agriculture	. . . . .		13,159,373
Budget of Industry and Labour.	. . . . .		4,397,728
Budget of Railways, Posts and Telegraphs.	. . . . .		169,923,891
Budget of War.	. . . . .		59,258,012
Budget of Finances and of Public Works	. . . . .		37,175,995
Budget of valueless entries and repayments	. . . . .		2,659,642
	Total	fr.	479,035,783
Extraordinary and special services	. . . . .		95,102,409
	General total.	fr.	574,158,192
Surplus receipts (+)	} Ordinary services	+ fr.	15,049,990
or		— »	46,430,078
expenses (—)		— »	31,380,088

On December 31st 1901 the Public Debt properly so called reached a capital of 2819 millions whereof 40 millions of francs in Bonds of the Treasury.

The service of this Debt required for the year 1900 an allocation of credits amounting together to 100,258,400 fr.

The figure of taxes has increased since 1880 in the proportion of 52 per cent. It was 28 francs for each inhabitant in 1880 and 35 francs in 1900.

§ 2. PROVINCIAL FINANCES.

In the matter of provincial finances, the Constitution proclaims the principle of publicity for the budgets and accounts, and subordinates to the assent of the provincial Council, save the exceptional cases foreseen by law, the establishment of any burthen or tax.

Like those of the State, the provincial expenses are subject to the control of the Court of accounts. Most of the rules established for the management of public funds, by the law on State accounts, are applicable to provincial accounts.

The Council closes every year the account of receipts and expenses of the preceeding year; it votes the budget of expenses for the year instant and the means of meeting them.

The budget of expenses has to be submitted to the approval of the King.

The total amount of provincial receipts in 1900, was 18,978,744 francs, whereof 15,572,321 francs represent the returns of provincial taxes.

Expenses have reached 18,382,348 francs, during the same year.

With regard to provincial loans, their total reached 33,574.479 francs on December 31st 1901.

§ 3. COMMUNAL FINANCES.

The same constitutional dispositions which, in provincial matters, require publicity of budgets and accounts, as well as the assent of the Council to establish burthens or taxes, are applicable to communal matters.

Communal Councils have to proceed yearly on stated dates, to the temporary settlement of the accounts of the proceeding year, and to determine the budget of expenses and receipts for the year instant. Their duty is to inscribe in the budget all expenses which according to law are incumbent to the commune, on pain of having them inscribed by order, by the superior authority.

The communal budget and accounts are deposited at the communal hall, where every tax payer is entitled to take cognisance of them; besides they are published by means of sticking bills and afterwards subject to approval of the permanent deputation of the provincial Council which closes them definitely.

The balance and amount of communal taxes, fixed by the communal Council, have to be submitted to the approval of the King.

To the College of burgomaster and sheriffs is committed the management of the commune's expenses and the supervision of its accounts. It is bound to verify at least once ever quarter the state of its funds which are entrusted to the communal receiver and to draw up a report (*procès-verbal*) of verification which is submitted to the Council.

The control of the expenses belongs to the permanent Deputation.

XI. Benevolence and Assistance.

Liberty of Charity combined with liberty of Association is exercised in Belgium without hindrance or control.

Public benevolence, on the other hand, is subject to established rules and to the supervision of the Authorities. The sole public charitable establishments are the alms houses and hospitals and the bureaus of Benevolence, of which the administrators are appointed by the communal Council. The burden of providing for the assistance of paupers is incumbent on the Commune of the *residence of assistance*. Law foresees the direct intervention of the communal funds in certain charges of public assistance; the Province and State contribute also by means of subsi-

dies to the expenses of treatment and keeping of special classes of sick or invalids, and to the expenses for the erection of hospitals, alms houses and lunatic asylums. The bureaux of benevolence and the alms houses have received, during 1901, donations between living persons and legacies amounting to 18,789,249 francs.

The disposal of the income of the paupers is left to the appreciation of the bureau of benevolence; the succours at home are as much as possible given in nature, and by the care of the members of the bureau, by the charitable committees or other people appointed, according to local-regulations. The bureau of benevolence organises also a health service for the destitute; it appoints the medical surgical and midwifery officers, as well as the apothecaries, subject to approval of the communal Council.

The hospitals and alms houses are placed in each locality under the administration of a single Commission to which is entrusted the management of their property, the domestic administration, the admission and discharge of the destitute, the appointment of the medical officers and the employés, and the contracts for food and other objects necessary to such establishments. The works of erection and repairs of the hospital buildings are subject to special regulations.

Seventeen institutes subsidized by State have been founded, to receive and educate deaf-mute and blind people; their population was 1546 souls in 1899.

The royal orphanage of Messines numbered 173 females; the homes for orphans and foundlings 45 in number, contained 2352 inmates.

All lunatic asylums, numbering 50, are subject to a permanent supervision exercised by the judicial and administrative authorities and by a special medical officer, appointed by the Government and who is independent of the Manager of the asylum: those not fulfilling the conditions of the law or those of their grant, are closed by order of the Government. The number of lunatics confined in these institutions reached the figure of 14,974 in 1900. The colonies of lunatics of Gheel and Lierneux are well known and are very interesting. Patients are boarded with the farmers, where they enjoy family life, under the control of a Commission of the medical service which watches over them and directs their treatment.

As for the works of private charity, they multiply daily in full and entire liberty.

Conferences of Saint Vincent de Paul, Philanthropic Societies; Societies for assisting the modest poor, works of night hospitality, &c., &c.

Let us mention specially the very complete organisation of the institutions which busy themselves with infancy : infant asylums, orphanages, kindergartens, refuge halls, scholar soup, clothing work, scholar clubs of every description, work called : open air for the little ones; societies for protecting martyr children. The State and the Communes often subsidize these works.

We should also mention amongst the important and highly meritorious works, the Patronage Commissions for discharged prisoners which are at present 29 in number, the Committees of Patronage for vagabonds, and the Committees of Patronage of Mons and of Tournai for the employment of discharged lunatics. These patronages are private institutions, but they are under the supervision of the State which subsidizes them.

Some establishments of assistance through labour, for men and workshops for women, have been operating for a few years and prove very useful.

The pawn-houses which play an important part in the economical situation of the labouring classes, specially at critical periods, may also find place in this very summary description of our provident institutions : seventeen of our principal towns are provided with them; these establishments have received as securities in 1901, 897,599 pawns and have lent more than twelve millions of francs.

A royal decree of April 3rd 1895 has intrusted a special commission with the care of studying the questions relating to the organization of public benevolence. Members of both Houses, magistrates, officials, philanthropists were called to participate to this commission. The works of this college from a remarkable report which concludes in the sense of a general codification and reorganization of the laws ruling public Benevolence and of the granting of civil personification, provided certain formalities be fulfilled, to the private works of assistance and succour.

XII. Worship.

The Constitution consecrates the following principles concerning the question of Worship.

Liberty of worship and of its public exercise are secured

THE CATHEDRAL OF S.S. MICHAEL AND GUDULA, BRUSSELS.

notwithstanding repression of misdemeanours committed on occasion of the use of such liberty. Nobody can be com-

pelled to participate in any way, to the acts and ceremonies of worship, nor to keep its days of rest. The State has no right of meddling with the appointment or the installation of the members of the clergy; it cannot forbid the latter to correspond with their superiors neither to publish their acts, despite in the latter case, of the ordinary responsibility in the matter of press and publication. The stipends and pensions of the recognised members of the clergy are at the expense of the State; and the necessary sums to meet it, are yearly inscribed in the budget.

There are in Belgium four *recognised* Worships :—

The catholic, protestant, Church of England and Jewish worships.

The Roman catholic religion is far the most practised in the country.

The Belgian territory is divided for the service of catholic worship in six dioceses comprising 185 deaneries.

At the head of one of these dioceses, including the provinces of Brabant and of Antwerp, is the Archbishop of Mechlin, at present, his Eminence cardinal Goossens, primate of Belgium.

The number of vicarages, curacies, chapels, &c., whereof the officiating attendants receive a salary from the State is 5311, to wit : vicarages 245, branches 3026, chapels 150, curacies 1889, coadjutorships 1.

INSIDE VIEW OF THE CATHEDRAL, BRUSSELS.

There are besides 574 churches and oratories of which the attendants are not remunerated by the State.

With each recognised church is connected a council of Churchwardens (*conseil de fabrique*) committed to keep the temple in repair, to administer the funds affected to the exercise of worship, to effectuate the expenses intended

to secure this exercise, and to maintain the dignity of the church.

The Council of Churchwardens deliberates on the budget and yearly accounts of the Church, which are submitted to the approval of the permanent deputation of the provincial Council in the case of parish churches or branches, and of the Government in the case of cathedral churches.

Failing regularly to present the budget or accounts, implies the suppression of every subsidy from the Commune, the Province or the State.

Similar regulations exist, concerning the accounts of the income of the protestant, church of England and jewish worships.

The bounties granted in 1901 to the churches and Seminaries, reach the figure of 1,186,663 francs.

According to the census of the population in 1900 the number of religious communities established in Belgium was 1040, and their population was 6237 males and 31,668 females.

EDUCATION.

The Belgian Constitution, article 17th, proclaims absolute liberty of teaching; every preventive measure is prohibited; the repression of misdemeanours resulting from the exercise of this liberty is regulated by law only.

Consequently any private person, Belgian or foreigner, or any private association can open any educational establishment whatever, without needing any authorisation or any previous declaration, without any security for capacity or morality being exacted from those desiring to teach, and without any special supervision being exercised. If abuses should follow the use of this absolute liberty, it belongs to the authorities entrusted with the prosecution and repression of misdemeanours, to afford remedies thereto.

The number of educational establishments founded in Belgium without the State's intervention, especially by the clergy, is considerable. There are two free Universities, whereof one (the one of Louvain) is dependent of the bishops; more than 80 small seminaries, institutes and colleges, whereof 50 are placed under the high direction of the bishops, and 30 belong to religious corporations; most of these institutions are much frequented, for instance the *Institut Saint-Louis* of Brussels numbers nearly 1500 pupils; more than 65 secondary schools for boys, of which 25 to the clergy and 24 to religious corporations; more than 150 institutions or boarding schools for girls, of which 107 managed by nuns. There are also numerous elementary schools, infant schools and schools for adults, created for a great part by the local committees of catholic schools, by the Brothers of the Christian learning, and by other convents. Finally in the great centres, are also private institutions which prepare specially for

the superior technical schools and for the Military School.

As for the education imparted at the expense of the State, namely the Government, the province or the com-

TOWN HALL OF LOUVAIN.

mune, the Constitution entrusts the law with the care of regulating it. And therefore no public educational establishment may exist or act except in execution or by force of law.

The free schools, whereof the utility is recognised, are sometimes admitted to receive subventions and even to be invested, by way of adoption, approval, patronage, &c., with a kind of official character, which assimilates them, to a certain extent, to the public schools. For this reason they are included in the statistics tabulated by the Government and in the figures hereafter mentioned.

Public education, imparted in the country, is *elementary, secondary and higher*.

The expense of the State according to the accounts of 1900 has been : -

For elementary educationfr.	15,219,025
For secondary education	4,378,791
For higher education	2,258,507

Those large subsidies have produced their effects. Instruction has made constant progress.

The proportion of young men at the age of military service, namely, being from 19 to 20 years old, unable to read and to write, was 29.33 per cent. in 1870. This proportion fell to 21.66 per cent. in 1880, to 15.92 per cent. in 1890, to 12.84 per cent. in 1899, and to 11.10 per cent. in 1902.

The General Administration of Elementary, Secondary and Higher Education, of sciences and letters, with the services of Inspection and the Councils of Improvement which are attached to them, depend of the Home and public Education Department.

With regard to the special Education of Fine Arts, the Agricultural Schools, and the Professional and Industrial Schools, we must refer to the Notice concerning the Direction of Fine Arts, the General Direction of Agriculture and the Direction of industrial and professional Education.

ELEMENTARY EDUCATION.

The official *Elementary Schools* are created and organized by the communes; there must be one at least in every locality.

Destitute children are educated gratuitly.

The teachers must possess a diploma of normalist or a corresponding certificate of capacity.

The Commune can adopt private schools presenting all guarantees and found infant schools, and also schools for adults.

The State, the Provinces and the Communes are empowered to establish elementary normal schools and to subsidize the private normal institutions regularly established and approved with this object.

The number of elementary institutions subject to State inspection is as follows :—

Elementary communal (parish) Schools.	4476	with	489,764	pupils.
Adopted and private elementary Schools } subject to State inspection }	2410	»	337,401	»
Infant Schools	2500	»	237,265	»
Schools for adults	3343	»	162,261	»
Elementary normal Schools.	54	»	4713	»

The Belgian Scholar Exhibition, organized by the Central Administration, comprises five great divisions :—

- 1° Frœbelian Education ;
- 2° Elementary Education ;
- 3° Education for adults ;
- 4° Normal Education ;
- 5° Social scholar works.

The principal object of this exhibition is :—

- 1° To place in evidence the new aspects of the systems of education in use in the frœbelian Schools (children from 3 to 6 years old), in the elementary Schools (from 6 to 14)

and in the Schools for adults (young people aged more than 14);

2° To show how the normal Schools prepare the aspiring school-masters and school-mistresses, for giving to the pupils of these three classes of schools an education which corresponds to the necessities of real life;

3° Finally to publish the organisation and the results of the scholar work of a moral and social character.

I

The new aspects of the Belgian systems of popular education are :—

1° The concentricity of the details of the general plan of Education.

The concentric character of the programs appears from the infant School which admits the children aged 3, 4 and 5 years.

There is no question here of Education, properly so called, but of a harmonious whole of exercises, calculated to cultivate the physical, intellectual and moral faculties of the little children, in order that when reaching the age of 6, they be prepared to follow, with profit, the lessons of the elementary School.

Each of the exercises of this whole program has for object a specified notion, and as is shown by the exhibited tables, this notion appears at the three degrees of the infant school; at the first to be inculcated, at the two others to be awoken, strengthened and extended, in a measure proportionate to the development of the child's faculties.

The concentricity of the programs is more emphasized and more apparent at the elementary school (children from 6 to 14 years), where exercises and lessons affect a didactic form which is well characterized.

A notion taught intuitively under its simplest form, at the inferior degree (1st and 2nd year of study), reappears

at the secondary degree (3rd and 4th years) according to the same general plan, but with an increasing wealth of connected ideas.

Finally the same notion appears in the superior degree (5th and 6th year) with wider developments still, through adequate applications to the various professions exercised in the locality or in the district.

All the series of exhibited tables make this concentricity manifest : the vertical direction shows the progressive development of the theoretical notion ; the horizontal direction shows its various applications and its adaptation to the questions of a practical description.

2° Professional tendency of education.

This professional tendency appears from the infant school. The construction with little sticks, tapes and cubes, &c. ; the exercises of modelling, folding, plaiting, weaving, &c., give the children simultaneously with manual cleverness, exact notions of the sizes, combinations, and special shapes which they will find again, when, seated on the forms of the primary school, they will receive an education with a strongly characterized professional tendency.

By the tables exhibited in the infant school compartment is seen, that a direct relation has been established between the observation and elocution exercises on the one, and the manual occupations on the other hand. From this succession of exercises it follows naturally that for the child, the notion is always intimately associated with its expression by words, always strengthened and made more conspicuous by an adequate manual occupation which requires the application of the mind and the action of the senses.

As said before, the professional tendency is strongly emphasized at the elementary school. Vague and vulgar applications have been forsaken, in which appears no care for initiating infancy to the realities and the requirements of life. Every profession supplies its contingent of practical exercises in reference with local needs. In this way no child is ignorant of the questions relating to his father's profession or to the one which he will exercise in

future times; the young girl applies her theoretical knowledge to domestic occupations and to needle work; the young boy applies them to agricultural or industrial subjects, according to the needs of the social medium in which he soon will exercise his personal activity.

The school for adults realizes in a larger measure still the motto: « School for life. » It consists often of *special courses*, adequate to regional or local necessities: it is in a certain sense, the professional school of the unimportant localities, where the elements of a special technical education are indispensable to manual labourers: farmers, mechanics, housewives, &c.

3° The easy, rational and economical preparation of the material implements for teaching.

The exhibited articles do not belong to the trade; they are manufactured by the schoolmasters and mistresses, according to the requirements of their teaching and with regard to the needs and the resources of the localities. Consequently they reveal a regional professional tendency: here the agricultural tendency, elsewhere the industrial tendency; in the boys' schools they are concerned with men's work, in the girls' schools with women's work; everywhere they are calculated to prepare the child for the intelligent practice of his future profession.

II.

The regulations and the program of the elementary normal schools, show the manner in which the literary, scientific and pedagogic preparation of schoolmasters and mistresses is carried on; the exhibited works show how the various lessons given, in the application school, to children having reached the age of elementary school, initiate the future masters into the art of manufacturing themselves and utilising with intelligence, a didactic equipment, answering to the various requirements of an education with professional tendencies.

This initiation is obtained by *drawing* and by *manual work* (paper, cardboard, wood modelling).

Drawing exercises the normalists in characterising instantaneously with a few rapid strokes a particular form, a movement, an attitude, a scene, &c.

Manual work initiates to the various ways of constructing implements which render theoretical teaching easy, attractive, and fruitful, on account of their direct and immediate application to the local professional occupations.

III.

The scholar works of a moral and social character are the following :—

- 1° The societies of little protectors of the animals;
- 2° The societies for protecting trees, plantations and public monuments;
- 3° The temperance societies;
- 4° The affiliations to savings-banks;
- 5° The affiliations to retiring-funds.

Ministerial circulars and special notices contain whatsoever concerns the organisation of these works.

The results acquired up to the date of December 31st 1902 are the following :—

- 1° Protection of animals : 3538 societies and 220,634 members;
 - 2° Protection of trees, plantations, &c. : 1920 societies and 139,800 members;
 - 3° Temperance : 3968 societies and 265,621 members;
 - 4° Savings-banks : number of pupils saving money 369,779; amount of savings 10,042,430 francs;
 - 5° Mutualities of help and retreat : 2,621 societies and 116,617 members; sums deposited 1,029,785 francs.
-

SECONDARY EDUCATION.

Secondary Education, imparted at the expense of the State, is ruled by the Acts of June 1st 1850, of June 15th 1882, of June 15th 1883 and of February 6th 1887, and by the Act of September 20th 1884 on primary Education, and by the Act of April 10th 1890-July 3rd 1891, regulating the collation of Academical degrees and the programme of University examinations.

Are subject to the rule of these organic laws, the Establishments of Secondary Education dependent of the Government, the Provinces and the Communes.

The Government Establishments are of two degrees :—

1° The superior Secondary Schools included under the denomination of Royal Athenæums ;

2° The inferior Secondary Schools which are called : Secondary Schools (*écoles moyennes*).

The number of these Athenæums must not exceed twenty ; the number of Secondary Schools for boys is one hundred, the number of said schools for girls is fifty.

The Royal Athenæums and the Secondary Schools under Government's management admitt only day-scholars. In the localities which are the seats of these establishments, the municipal boards may agree with private persons, to keep boarding schools connected with the Athenæum or the Secondary School.

There are three categories of *provincial or communal establishments* for secondary Education :—

1° The communal or provincial establishments subsidized by the Public Treasury ;

2° The establishments exclusively supplied by the communal or provincial budget ;

3° The private establishments to which the commune

grants its patronage, supplying them subsidies or buildings.

The organization of these establishments is similar to that of the Government's establishments.

The provinces or the Communes appoint the staff of the establishments under their management.

The management of the Royal Athenæums and the State Secondary Schools belongs to the Government which appoints to all employments. It performs the supervision through the medium of *inspectors* and of a *local bureau of administration*.

The teaching staff is composed of a *headmaster (préfet) of studies* for the Athenæums, of a *Director* for the Secondary Schools and of *professors, regents, teachers and schoolmasters*.

The administrating staff is composed of the members of the bureau of Administration; and if necessary, of a secretary treasurer and study masters and overseers.

The salaries of the staff are determined by the Government.

None can be appointed to the office of professor in the public Schools unless he be in possession of the diploma required by law or by regulations, prescribed in execution of the laws, and unless he be belgian or naturalized.

The diploma required for a professorship in the superior Secondary Schools, is delivered by the faculties of the Universities or by a Central Jury constituted by the Government.

The diploma required to teach in the inferior degree of secondary education, is delivered by juries instituted by the Government and attending to the normal schools which it manages and to normal pedagogical establishments belonging to private education.

In each Athenæum there are two educational courses. The course of ancient humanities (*græco-latin* and *latin*) and the course of *modern humanities* comprising in the upper classes a scientific division and a commercial or industrial division. The duration of the curriculum in each of the three sections of the Athenæum is seven years.

Most of the secondary schools have a *preliminary section* composed of six classes or years of study, and where the subjects attributed to primary education are

taught. The duration of the curriculum in the secondary schools, properly so called, is of three years.

The secondary education comprises : religious teaching ; the teaching of ancient humanities comprises : the precepts of rhetoric and poetry, the study of the greek, latin and french languages, and also of the flemish, german and english languages ; the elementary parts of mathematics, arithmetic, algebra, geometry, rectilinear trigonometry, and notions of natural philosophy ; universal history and history of Belgium, ancient and modern geography, geography of Belgium ; notions of constitutional and administrative institutions, drawing, calligraphy, vocal music and gymnastics.

The teaching of the section of modern humanities comprises : rhetoric and the study of the french, flemish, german and english languages, mathematics, analytic and descriptive geometry, spheric trigonometry, with their applications to the arts, industry and commerce ; natural philosophy, mechanics, chemistry, natural history and astronomy, bookkeeping, commercial law, political economy ; modern history and geography, history and geography of Belgium ; notions of constitutional and administrative institutions, graphical arts, vocal music and gymnastics.

The curriculum of the secondary schools comprises : the study of the french and besides the flemish or german languages ; reasoned arithmetic, elements of algebra and geometry, drawing, land-measuring and other applications of practical geometry, calligraphy, bookkeeping, and notions of commercial law ; notions of natural sciences, elements of geography and history and especially of Belgian history and geography ; vocal music and gymnastics.

Besides, in the secondary schools for girls, the teaching comprises : manual work (needle work) and domestic economy.

In the flemish part of the country, the teaching of the preliminary sections connected with the State secondary schools, is imparted in flemish. In the secondary sections of the schools of the flemish region, and also in the Athenæums of the same region, the lessons of flemish, german and english (optional courses) and at least two courses of the programme are professed in the flemish language.

Courses of maritime notions and of navigation and

elementary courses of agronomy are organised in several establishments for secondary education of both degrees.

Special sections : commercial, industrial or agricultural are annexed to a certain number of secondary schools. Besides the courses of general education, the programme of each of these sections comprises matters relating to the local needs.

The Government by creating this special teaching, pursued the object, of imparting to the secondary studies, a character more suitable to the needs of modern times, and specially intended to give to the middle classes a plainly practical and directly useful education.

While organising Education, properly so called, the Government has not neglected the moral side of the subject and from this point of view, it is meet to point out specially, the institution, in the secondary schools, of a special teaching, having for its object to combat alcoholism and encourage the foundation of scholar societies of mutuality and retreat.

	Number of institutions.	Number of pupils.
Royal Athenæums	20	5,910
State Secondary Schools for boys	78	14,507
State Secondary Schools for girls	34	5,775
Communal colleges	7	720
Colleges patronized by the Communes	8	952
Communal Secondary Schools for boys	5	1,997
Secondary Schools patronized by the Communes	5	767
Communal Secondary Schools for girls	5	1,840
State normal secondary Sections for boys	2	37
" " " " " girls	2	71
<i>Special sections annexed to State secondary schools for boys :</i>		
Commercial sections	6	141
Industrial sections	1	22
Agricultural sections	1	6
<i>Special sections annexed to State secondary schools for girls :</i>		
Commercial sections	3	63

In order to be admitted afterwards to the courses of Higher Education and to undergo their examinations, the pupils of official or private Establishments, must, according to the Act of April 1890, either justify of a Certificate of a complete curriculum of ancient humanities or secon-

dary scientific studies, or else undergo a special preparatory examination.

A special jury appointed every year by the King is committed to verify the certificates and to proceed to these preparatory ordeals. This jury is composed in such manner that the professors of the official and those of the private establishments are represented in equal number. The president is chosen outside of the teaching body.

To be admitted to the special technical schools of the Universities, examinations are compulsory; their program is adequate to the aim of these institutions.

HIGHER EDUCATION.

There are in Belgium two Universities where Education is imparted at the cost of the State, one at Ghent, the other at Liege. Their organisation is the object of title 1st of the Act of July 15th 1849.

Besides these official establishments, are flourishing two free Universities : the Catholic University of Louvain and the free University of Brussels, created in virtue of the principle of liberty of Education, proclaimed by the Constitution.

The Universities of Ghent and of Liege were established in 1816 and reorganised by the Act of September 27th 1835.

The ancient University of Louvain was created and installed on September 7th 1426 by John IV., Duke of Brabant, with the approval of the Pope Martin V. Its teaching was rendered illustrious from the XVth and XVIth centuries by Erasmus, Justus-Lipsius, Gerard Mercator, Ortelius, Vesale, &c.

THE UNIVERSITY HALLS, LOUVAIN

The monopoly of the University of Louvain was long absolute and its name is inseparable from the history of the development of human knowledge in our regions.

A decree of the Directory, dated Brumaire 4th year VI., suppressed the ancient University of Louvain.

The present Catholic University of Louvain, was at first established in Mechlin where it was inaugurated on November 4th 1834; it was installed in Louvain, on December 1st 1835, when it took again possession of the

INSIDE VIEW OF THE UNIVERSITY HALLS, LOUVAIN.

premises occupied by the antique and celebrated University of which the new establishment resumed the traditions.

The free University of Brussels was founded on November 20th 1834.

Each of our four Universities comprises the four faculties of philosophy and letters; of mathematical, physical and natural sciences; of law and of medicine. The Catholic University of Louvain includes besides a faculty of theology.

The University of Liege possesses a technical faculty : school of arts, manufactures and mines. To the faculty of sciences of the University of Ghent is attached a school of civil engineering and of arts and manufactures. The free University of Brussels possesses a faculty of applied sciences : polytechnical school. To the faculty of sciences of the University of Louvain, are annexed special schools of mining, of civil constructions, of arts and manufactures, of architecture and of electricity.

The University of Louvain comprises also an agronomic institute, and a superior school of brewery.

The interior organisation of the four Universities hardly differs, except in the details.

Education is imparted by ordinary and extraordinary professors and by *chargés de cours* or supernumerary professors.

Each University has a governor called *recteur* appointed by the King for the State Universities; the *recteur magnifique* of the Catholic University of

UNIVERSITY OF GHEENT.

Louvain is appointed by the episcopal body. In Brussels, the rector is appointed by the managing board of the University.

A Commissioner of the Government, bearing the title

of Administrator-Inspector, watches in both State Universities, over the execution of the laws and regulations, the preservation of the collections and implements and the proper use of the funds granted by Legislature.

At the University of Brussels is also an Administrator-Inspector, whose appointment originates with the Council of Administration. But there is no such authority at the University of Louvain where the rector is assisted by a vice-rector appointed by the episcopal body.

According to the Act of April 10th 1890-July 3rd 1891, the four Belgian Universities are entitled to deliver legal diplomas, namely diplomas allowing the bearer to exercise in Belgium certain professions or to fulfil certain offices for which the possession of such diploma is required. A special commission, instituted by the Act of April 10th 1890 attends to the ratification of the academical diplomas.

The juries instituted by the Government may also deliver these legal diplomas which are 15 in number, viz. :—

- The diploma of candidate of philosophy and letters;
- ” ” of candidate of law;
- ” ” of candidate of physical and mathematical sciences;
- ” ” of candidate of natural sciences;
- ” ” of candidate of medicine, surgery and midwifery;
- ” ” of candidate notary;
- ” ” of candidate engineer;
- ” ” of doctor of philosophy and letters;
- ” ” of doctor of laws;
- ” ” of doctor of physical and mathematical sciences;
- ” ” of doctor of natural sciences;
- ” ” of doctor of medicine, surgery and midwifery;
- ” ” of pharmaceutical chemist;
- ” ” of civil engineer of mines;
- ” ” of engineer of civil constructions.

Women can obtain all these academical degrees, and they can besides exercise in Belgium the professions of physician and chemist.

But the Belgian Universities deliver not only legal diplomas, they grant also scientific degrees to which no right is attached, and which constitute only for the bearers a certificate of capacity concerning such or such science or group of sciences.

Both State Universities, as well as the two free Universities are entitled to deliver, as scientific diplomas, every one of the legal diplomas. Besides these diplomas each

University grants the scientific degrees for the obtainment of which the Government for the State establishments, and the managing authorities for the free universities, have judged useful to institute a complete system of studies and examinations.

At the Universities of Liege and of Ghent, the pupils may obtain as far as these scientific degrees are concerned, the following diplomas :—

- Candidate of political sciences;
- Licenciate and doctor of administrative sciences;
- Licenciate and doctor of social sciences;
- Licenciate and doctor of political sciences;
- Licenciate of commercial sciences;
- Licenciate of the superior degree of commercial and consular sciences;
- Candidate of geography;
- Licenciate and doctor of geography;
- Engineer chemist;
- Engineer of mechanics;
- Engineer of electricity.

The University of Liege delivers besides the diplomas of :—

- Candidate of physico-chemical sciences;
- Doctor of physico-chemical sciences;
- Candidate of arts and archeology;
- Licenciate and doctor of arts and archeology;
- Engineer geologist;
- Candidate engineer of arts and manufactures;
- Engineer of mines;
- Engineer chemist-electrician.

And the University of Ghent the diplomas of :—

- Civil engineer;
- Engineer architect;
- Industrial engineer;
- Civil conductor.

The University of Louvain also grants the following degrees :—

- Candidate, licenciate and doctor of theology;
- Candidate, licenciate and doctor of moral and historical sciences;
- Licenciate and doctor of philological sciences;
- Doctor of oriental letters;
- Candidate, licenciate and doctor of thomistic philosophy;
- Licenciate notary;
- Candidate of political sciences;
- Licenciate and doctor of political and social sciences;
- Licenciate and doctor of political and diplomatic sciences;
- Candidate, licenciate and doctor of commercial sciences;

Licenciante of the superior degree of commercial sciences;
 Licenciante of the superior degree of commercial and consular sciences;
 Candidate, licenciante and doctor of geographical sciences;
 Expert-chemist;
 Engineer of arts and manufactures and of mines;
 Engineer constructor;
 Engineer architect;
 Engineer electrician;
 Agricultural engineer;
 Agricultural expert-chemist;
 Engineer brewer.

Finally at the University of Brussels, the pupils can obtain the following degrees :—

Licenciante and doctor of political and administrative sciences;
 Licenciante and doctor of economical sciences;
 Licenciante and doctor of social sciences;
 Commercial engineer;
 Civil engineer;
 Engineer of arts and manufactures.

As for teaching, properly so called, it is organised in the four universities according to the most modern tendencies. Most of the oral courses in the faculties of philosophy and letters and of law, are completed by practical exercises and seminary works.

In sciences and medicine, the investigations and practical works, in admirably fitted laboratories, hold an important place next to the teaching from the pulpit.

All the matters taught, do not necessarily constitute matters of examination; the university programmes namely, have been enriched for the last years with numerous courses, optional for the pupils, and among which one may most specially point out, the courses of oriental literature, egyptology, mythology, modern languages, bibliography, bacteriology, otology, laryngology and rhinology, gynecology, tropical diseases, &c., &c.

To impart education in the State Universities there are thirteen professors of sciences (twelve at the University of Liege); twelve of philosophy and letters, thirteen of medicine and ten of law. The technical faculty of the University of Liege numbers ten professors and moreover the Government can appoint one or two more professors in each faculty where it judges it necessary.

As for the number of supernumerary professors it is not limited. But next to the teaching staff, each State

University possesses a numerous assistant staff, tutors, masters of works ; assistants, providers, assistant-providers, &c.

At the University of Louvain, are ninety-five ordinary and extraordinary professors, and three supernumeraries (*chargés de cours*).

The University of Brussels numbers seventy five ordinary and extraordinary and
thirty-six *chargés de cours*

HALL OF NATURAL HISTORY, LIEGE.

There is 805 of
whom 92 are foreigners;

At the University of Liege 1644 of whom 389 are foreigners;

At the University of Louvain 2011 of whom 200 are foreigners;

At the University of Brussels 999 of whom 150 are foreigners.

At the College *Notre-Dame de la Paix* of Namur, courses of philosophy and sciences are organised, to prepare for the examinations of candidature of philosophy and letters, and candidature of natural sciences. The courses of philosophy are frequented by 80 pupils (1903-1904) those of sciences by 28.

Similar courses preparatory to the examinations of candidature of philosophy and letters, at the *Institut*

INSTITUTE OF PHYSIOLOGY, BRUSSELS.

Saint-Louis of Brussels, are followed by 75 pupils (1903-1904).

Special juries, appointed by the Government, attend to the examinations, for the pupils of both institutions.

Our four universities have not failed during, the last years, to favour scientific studies by the creation of a multitude of special institutes. Let us mention :—

Ghent: Botanical and Bio-geographical Institute; Insti-

tute of Sciences, affected to the faculty of Sciences and the special schools of civil engineering and of Arts and Manufactures; Institute of applied mechanics; Institute of Anatomy; Institute of Physiology; Institute of hygiene and Bacteriology; Institute of Therapeutics and of Pharmacodynamics; and a Clinical Institute, in course of construction, close to the civilian's Hospital.

Liege : Institute of Zoology, compared anatomy and embryology; Institute of Anatomy; Institute of Physio-

ELECTRO-TECHNICAL INSTITUTE MONTEFIORE, LIEGE.

logy; Institute of pathological Anatomy and Bacteriology; Institute of experimental Therapeutics and legal Medicine; Institute and Musæum of Hygiene; Institute of Pharmacy; Institute of Botany; Institutes of Chemistry and of Natural philosophy; Electro-technical Institute Montefiore; Institute of Astronomy, on the table-land of Cointe.

Brussels : Botanical Institute; Institute of Mechanics, and the Institutes of Physiology, of Bacteriology and Hygiene and of Anatomy, established in the *parc Leopold*,

Louvain : Superior Institute of Philosophy; Institut *Carnoy* of Citology and general biology; Zoological Institute; the Vesale Institute for Anatomy; the Rega Institute and Laboratory of Normal Histology; Electro Mechanical Institute; Agricultural Institute and Brewery School.

The Catholic University of Louvain possesses « Pedagogies » where students can obtain board and lodging, viz : the college of the Holy Ghost for theologians; the college of the pope Adrian VI. for the students of the faculties of philosophy and law; the college Juste-Lipse for the students of the faculties of sciences and medicine; the seminary Leo XIII. for the students of the superior Institute of philosophy.

Moreover, student's life is very inexpensive in our University towns and costs certainly much less than in the great University towns of other countries.

Liege is indebted for its electro-technical Institute, to the munificence of Mr. Montefiore whose name it bears.

The University of Brussels receives very few subsidies from the Town or the Province; its special Institutes are the gifts of wealthy Belgian manufacturers. As for the University of Louvain it is almost entirely dependent on the generosity of the Catholics.

Are these great institutions of higher education, not the best evidence that the Belgians know how, to exercise with fervour and logical sense the liberty of teaching?

ENGINEERS' CLUB OF THE MINING SCHOOL, LIEGE.

Something remains to be said, on the University competitions yearly instituted on the matters of examination of higher education.

The laureates of these competitions are the recipients of gold medals, with besides, prizes, worth 400 francs, either in cash or in books.

Travelling scholarships may also be granted to these laureates, on the proposal of the juries of these competitions.

The ordeals are judged, by as many juries, as there are groups of matters, for which competitors presented themselves. The juries are appointed by the King and number five members, one being chosen outside of the educational body, the four others in each of the four Universities.

From the preceeding informations may be inferred that, with regard to high intellectual culture, Belgium has nothing to envy to the nations where higher education is most developed.

SCIENCES AND LETTERS

With the General Administration of Higher Education are connected *Sciences and Letters*.

The degree of civilisation of a country may be judged of by the care it bestows on, and the encouragement it grants to the culture of sciences and letters.

In this regard Belgium does not give precedence to any other nation, as will be shown by the following enumeration of its principal scientific and literary institutions.

I. The Royal Academy of Sciences, Letters and Fine Arts of Belgium.

It is divided in three classes. The *class of sciences* is composed of two sections : the section of mathematical and physical sciences, and the section of natural sciences. The *class of letters and of moral and political sciences* is composed of two sections, namely : the section of historical and philological sciences, and the section of moral and political sciences. The *class of fine arts* is composed of the following subdivisions : painting, sculpture, engraving, architecture, music, sciences and letters in their relations with fine arts.

Each class is composed of thirty members, and besides numbers, fifty foreign associates, and ten native correspondents at the utmost. Each class proceeds itself to the election of its members. The appointments are subject to the Royal approval.

Each class organises yearly competitions on different questions, to each of which is attributed as a prize, a gold medal of a value of 600 francs at least.

ACADEMIES' PALACE, BRUSSELS.

The principal publications of the Academy are the following :—

- 1° Memorials of the members, associates, correspondents, in-4°, 54 volumes;
- 2° Crowned memorials and memorials of foreign learned men, in-4°, 62 volumes;
- 3° Crowned memorials and other memorials, in-8°, 63 volumes;
- 4° Bulletins of the sittings, in-8°, 160 volumes.

II. The Flemish Royal Academy.

Its object is the study and culture of the language and literature of the Netherlands.

The Academy is composed of twenty five titular members; it numbers also ten native correspondents, twenty foreign associates and one native honorary member.

Special commissions attend to :—

- 1° The study of the ancient germanic languages and of the mediæval idioms; the edition of works referring to these matters, and also the study of the local dialects;
- 2° The study of the modern language and literature;
- 3° The study of history, biography and bibliography;
- 4° The study of the questions relating to the teaching in the Netherlands' language;
- 5° The study of toponymy.

There is also in the Academical body a Commission charged with the control of the « Grand Dictionary of the Netherlandish language. »

The Company organises yearly competitions on various questions concerning the language and literature of the Netherlands, national history and archeology, fine arts and bibliography; to each of these questions prizes of different value are attributed.

The Academy's principal publications are the following :

- 1° Bulletin of the sittings (in-8°);
- 2° The annual (in-8°);
- 3° The memorials of members, associates and correspondents (in-8°);
- 4° The crowned memorials (in-8°);
- 5° The publications approved by the Academy, on proposal of various Commissions.

III. The Royal Academy of Medicine.

Its object is : 1° to answer the questions made by the Government; 2° to busy itself with all studies and investigations capable of contributing to the progress of the different branches of the art of healing.

It is composed of 40 titular members and of honorary members. It numbers also Belgian correspondents and foreign correspondents.

IV. The Royal Commission of History.

Instituted in order to investigate and bring to light the unpublished Belgian chronicles, relations, cartularies and other similar unpublished documents. It is also commissioned with the publication of a chronological table of the printed charters and diplomas concerning the history of Belgium.

It is composed of seven members and of substitutes.

The Royal Commission of History has issued 109 volumes of unpublished Belgian chronicles, and 105 in-8° volumes of reports of its sittings and of appendices to these reports.

V. The Commission charged with the publication of a National Biography.

It is composed of fifteen members elected in equal numbers by each of the three classes of the Royal Academy.

It may associate for the work of redaction with other members of the Academy and also with scholars and native men of letters who do not belong to this Company.

Organised by ministerial decree of May 29th 1860 it has published hitherto 18 volumes.

VI. Central Commission of Statistics.

The principal attributions of this Commission are : —

1° To draw up a complete plan of the statistics of the country;

2° To point out the gaps or the superfluous details existing in statistic publications;

3° To give its opinion on the models of lists intended to collect or to class statistical informations;

4° To watch that every useless repetition be avoided in the demands for information and in the publications themselves;

5° To give a motived opinion on the schemes of reports to the King, relating to the statistical works of the various Departments, when these reports are to be made public;

6° To direct the publications of the general statistics at the Home and Public Education Departments;

7° To make all proposals which would seem calculated to introduce unity or improvements in the statistical works.

The Commission publishes a *Bulletin* of its works. Very numerous publications have been made with the assistance of the Commission.

VII. The Royal Observatory of Belgium, at Uccle.

The works of the Observatory are portioned out to two distinct services : the astronomical and the meteorological service.

The astronomical service comprises : astronomy of position, physical astronomy and physics of the globe.

The meteorological service embraces the observation of the meteorological instruments, redaction and publication of the observations, &c., and, generally, whatever is connected with the study of climate in Belgium.

VIII. The Royal Library.

The Royal Library is placed under the direction of a chief librarian (*conservateur en chef*).

It is subdivided into five sections, each of them under the management of a librarian :—

1° The section of printed matter which includes about 400,000 volumes;

2° The section of *manuscripts* which comprises about 27,000 manuscript works ;

3° The section of prints, charts and plans, which possesses about 80,000 prints classed and fitted up, and 10,000 charts and plans ;

4° The section of *medals* and *coins*, which contains about 50,000 medals, coins and counters ;

THE ROYAL LIBRARY, BRUSSELS.

5° The bureau of entrance, outside loans, administration, &c.

The Royal Library possesses besides an exhibition room where are permanently exhibited the most curious or the rarest specimens, of the history of books, miniatures and engravings, &c.

IX. The International Office of Bibliography.

The International Office of Bibliography, has for object the establishment and publication of a Universal bibliographical Index, the service of this index and the study of all questions relating to bibliographical pursuits.

The manuscript on tickets of this index, in course of

elaboration, is deposited at the seat of the Office where it may be consulted by the public.

The Office takes also charge of the sending, when requested, to scientific establishments, public administrations and private persons, of extracts from the Universal Index, in the shape of type-written tickets.

X. The Belgian Royal Commission of International Interchanges (literary section).

This section is charged to interchange with the contracting States, the following publications :—

- 1° Official, parliamentary and administrative documents which are made public in their place of origin ;
- 2° Works executed by order and at the expense of the government.

XI. The General Archives of the Kingdom at Brussels.

The depository is managed by the General Archivist of the kingdom.

It is subdivided into four sections : one chief of section is at the head of each of them.

XII. State Archives in the Provinces.

A depository exists in each of the following towns : Antwerp, Arlon, Bruges, Ghent, Hasselt, Liege, Mons and Namur.

Each depository is managed by a director (*conservateur*).

The Administration of Archives has published a very great number of inventories.

XIII. The Belgian historical Institute of Rome.

Its principal objects are :—


- 1° To investigate the Italian and specially the Vatican's Archives ;
- 2° To proceed in these archives to a methodical collection of the documents relating to Belgium ;
- 3° To publish the result of these proceedings.

XIV. The Royal Museum of Natural History of Brussels.

The Royal Museum of Natural History of Brussels includes all zoological, paleontological and mineralogical documents belonging to the State, which are not affected to the special service of the Educational establishments.

Among the remarkable specimens we shall mention those proceeding from investigations carried out in Belgium.

The Mammoth found in Lierre in the Antwerpian Campine; the mammifera collected in the caverns of the highlands of Belgium; the remains of cetaceous animals discovered pending the construction of the fortified circumvallation of Antwerp; the remains of twenty-nine specimens of *Iguanodon Bernisartensis* and *Mantellii*, five of them fitted up in a walking attitude, the fifth preserving the lying posture in which it was at the moment these fossil remains were discovered; the collection of the gigantic marine saurians of the jurassic and cretaceous deposits of the Limbourg and the neighbourhood of Mons, &c.



IGUANODON (15 to 18 foot high).

NATURAL HISTORY COLLECTION, BRUSSELS.

Let us mention also the so called « Cavern Room » containing besides the organic remains of animals of the quaternary age, numerous specimens showing the different industries practised, during the age of the stone, by the inmates of these caverns.

Finally the Museum has been enriched recently with an admirable collection of flints, cut and utilised by men during the prehistorical ages.

XV. The State Botanical Garden, in Brussels.

The State Botanical Garden in Brussels comprises collections of living plants, of dry plants, of fossil vegetables,

and of all kinds of objects suitable for the study of botany and horticulture, and also a sylvicultural Museum.

These collections are subdivided into five sections :—

- 1° Living open air plants;
- 2° Living hot-house plants;
- 3° Herbaria;
- 4° Fossil vegetables;
- 5° Carpology, medical and industrial matters, anatomical preparations.

XVI. The Zoological Garden of Antwerp.

This garden is one of the finest and of the most complete of Europe.

Let us signal before closing this sketch, a few important libraries which are worth mentioning : the libraries of the House of Representatives and of the Senate, those of the Courts of Justice, the Academies, the Universities, the Observatory, the Military School, the various ministerial Departments, viz. the library of the Central Commission of Statistics, at the Home and Public Education Department, the library of the Foreign Department, and the library of the Office of Labour at the Industry and Labour Department.

There is the Kingdom a very considerable number of popular libraries : 624 belong to the communes, 454 are indebted to private initiative.

The census of 1901 returned for these libraries :—

Number of volumes, 1,311,215.

Yearly number of loans 1,519,479.

Let us remind that the belgian Jesuits continue the task they have undertaken to perpetuate the hagiographical work of the *Acta Sanctorum*, commenced in the xviiith century by John Bolland (1596-1665).

Most of our great towns possess literary scientific, archeological, &c. societies and depositories for archives numismatic cabinets, museums of Archeology, &c.

An Institute of Sociology has been created lately in Brussels thanks to the bountifulness of Mr. E. Solvay.

Various associations issue Reviews concerning scientific

or technical subjects; medicine, law, political and social economy, french or flemish literature, &c.

In 1901 were published in Belgium, 112 daily newspapers, 786 issued at least once a week and 578 at longer intervals.

Encouragements to Sciences and Letters.

To encourage culture of Sciences and Letters, the Government :—

1° Sends every year two belgian doctors to the French school of Athens;

2° Hires a study table : (a) at the Zoological Station of Naples; (b) at the Laboratory of Leopoldville (Congo);

3° Has created a certain number of triennial, quinquennial and decennial prizes, which are as follows :—

Triennial prizes of dramatic french and of dramatic flemish literature. Gold medal of a value of 150 francs, besides a sum of 500 francs at least and 1500 francs at most.

Quinquennial prizes relating to the history of the country, historical sciences, social sciences, french literature, flemish literature, physical and mathematical sciences, natural and medical sciences.

Decennial prizes relating to philosophical sciences and to philology.

The value of each of these quinquennial and decennial prizes is 5000 francs.

In 1874 the King has instituted *an annual prize of 25,000 francs* for the best work in manuscript or printed in Belgium, and sent in reply to a question of which His Majesty reserves the right of redacting the text. The competition is ruled by periods of four years : during the three first years of each period, it is exclusively open to Belgians; on the fourth year foreigners are admitted to compete.

There is also a certain number of prizes founded by private persons in order to encourage the works of literature and national history, and the publication of works

relating to elementary and secondary Education, social economics and statistics.

The Government improves also every opportunity to encourage the attempts made by private initiative and having for their object to promote progress of sciences and letters. Let it be sufficient to remind as an instance the *Belgian Antarctic Expedition* of which the reports are still in course of publication.

TOWN-HALL OF OUDENAARDE.

FINE ARTS

The glorious art traditions of our country have not failed to maintain and manifest themselves since our national independence, through a series of artists, painters, sculptors, engravers, architects and musicians whose talent is highly appreciated.

The Government favours and protects the artistic movement through the organization of special teaching for all branches of Fine Arts and by measures of encouragement and high patronage.

The Direction of Fine Arts is connected with the Agricultural Department; its budget for 1904 shows the figure of 2,25

Artistic Education

The Direction of Fine Arts and the Inspection Services the connected are assisted, for organization of Artistic Teaching, by two commissions :-

The Council of advancement for teaching the art of drawing; and the Council of advancement for teaching music.

Numerous establishments for the study of drawing, painting, carving, engraving and of architecture, are subsidized and inspected by the Administration.

STATUE OF RUBENS, ANTWERP.

Let us first mention Antwerp, seat of the Superior Institute of Fine Arts and the (properly so called) Academy. These institutions, which are managed at the present time, by M. J. De Vriendt, number 1134 pupils.

To the Royal Academy of Fine Arts in Brussels, is annexed a School of Decorative Arts.

The towns of Ghent and Liege possess also well frequented Academies. Besides in every locality of some importance is found either an Academy or a School of drawing.

P.-P. RUBENS.

In 1902 these institutions numbered 79, with a population of 13,121 pupils.

Teaching is everywhere gratuit.

The Budget foresees yearly the necessary allocations to grant Scholarships to the most deserving pupils.

Every year the great competition takes place (called « of Rome ») which treats alternately on painting, carving, architecture and engraving. This competition is triennial for the three first branches and quinquennial for engraving. The laureates receive a yearly pension of 5000 fr. which allows them to go abroad to perfect themselves.

For the teaching of music, there are first four « Royal Conservatories. »

The Conservatory of Brussels was created on February 13th 1832 and is at the present time directed by M. Gevaert; an « Instrumental Museum » containing an interesting collection of ancient and modern musical instruments is thereto annexed; a « Commission for the Publication of the works of ancient belgian musicians » is formed among the Professors.

The royal Conservatories of Liege and of Ghent and the royal flemish Conservatory of Antwerp possess also

THE DESCENT FROM THE CROSS, BY RUBENS, CATHEDRAL OF ANTWERP.

ENTOMBEMENT, BY VAN DYCK, MUSEUM OF ANTWERP.

numerous pupils and very meritorious masters.

The whole of the country numbers 55 Musical Schools subject to State inspection and subsidized out of the funds of the public Treasury. These institutions are frequen-

pils.

mpe-

com-

place every other year.

reason that, besides this special teaching, control of the Direction of Fine Arts, there classes of drawing and music in the free and Elementary Schools and in the establish-ary Education of every kind.

tions of industrial and professional teaching on the Department of Industry and), as a matter of course, classes of drawing, ing and modelling, in accordance with the hnical schools.

VAN DYCK.

Encouragement to Fine Arts.

Every year a general Exhibition of Fine Arts, alternately organized at Brussels, Antwerp and Ghent, gives the opportunity of conceiving a collective idea of the artistic activity of the country. These Exhibitions are well frequented and constitute real artistic solemnities. Musical recitals are often organized there, and these meetings seem in this way real manifestations of Art under all its aspects.

Exhibitions are also organized by private Societies in the different towns of the country. The artistic Circles and the Societies for encouraging Fine Arts are numerous and the highest of belgian Society make it a point of honour to contribute to the success of these associations.

The Government does not fail to participate officially to the important international Exhibitions organized in foreign countries. Our artists have always obtained there a large and brilliant share of awards and honours.

The royal Museums of painting and sculpture of Brussels, which were founded in January 7th 1835, contain, a great number of works of the most illustrious of our ancient masters and beautiful compositions of the Modern Belgian School.

The Museum of Antwerp possesses also celebrated

FINE ARTS' MUSEUM, ANTWERP.

works; Ghent, Liege and other towns have also their Museum of Fine Arts, of which the collections increase partly through acquisitions made with the financial assistance of the Government.

Especially in Antwerp, Brussels, Ghent and Bruges, the churches, hospital buildings, communal museums and town halls possess celebrated works of art. It is the Cathedral of Antwerp which is in possession of the « Descent from the Cross » and the « Elevation of the

Cross » by Rubens In Bruges, the works of the primeval flemish school constitute an invaluable treasure.

The royal Library of Brussels, and especially the Library called « of Burgundy, » contains precious archives and ancient manuscripts adorned with miniatures recalling to

ENTOMBMENT OF CHRIST, BY QUINTEN MATSYS, MUSEUM OF ANTWERP.

mind the artistic magnificence of the Court of the Dukes of Burgundy.

Brussels can boast also of a « Royal Museum of Decorative and Industrial Arts » containing collections of antiquities and products of ancient and industrial arts, a « Museum of Arms and Armour » and a Collection of mouldings from works of ancient art. The public can

obtain reproductions of these mouldings, and all kinds of schools find there, models for their drawing or modelling classes.

With the Direction of Fine Arts are connected :—

The directing commissions of the Museums of Fine Arts;

The Commission of supervision of the Royal Museums of Decorative and Industrial Arts ;

The Commission of the Royal Museums of Antiquities and Armour ;

The Artistic Section of the Royal Belgian Commission for International Interchanges.

A royal decree of January 7th 1835 has established a « Royal Commission of Monuments » to which is committed the supervision of the works which are required for keeping in repair and restoring the civil or religious buildings « remarkable for their antiquity, for the recollections which they awake, or for their artistic importance. »

The summary of the works of these various Commissions is published by a special committee. This publication bears the title of *Bulletin of the Royal Commissions of Art and Archeology*.

Encouragement to musical art has never failed in our country which numbers always musical artists and composers of high merit.

Subsidies are foreseen in the Budget for the publication and execution of national compositions, the organisation of recitals, &c.; a Royal Decree of September 1st 1898 has created a « Committee of Dramatic Musical Art » called to give its opinion concerning the

FINE ARTS' MUSEUM, BRUSSELS.

subsidies to be granted for the representation of Belgian composers' works.

There exist in Belgium about twenty theatres, regu-

larly exploited and many others which have no permanent company. The most important of these theatres receive direct or indirect subsidies from the metropolitan authorities which most often assume to supply the buildings.

Let us remind that some of the most celebrated musical, vocal and dramatic artists bear belgian names and that numbers of foreign artists have received their artistic education in our conservatories or have found at our

THE MUSEUMS OF DECORATIVE AND INDUSTRIAL ARTS, BRUSSELS.

theatres, and specially at the « Royal Theatre of the Monnaie » in Brussels, their first successes.

Is it needful to add, there is perhaps no country in the world where the taste for music has created more Societies of « fanfares, » of Symphony, of Harmony, and more choirs than in Belgium. Liberty of association and of meeting allows the spontaneous production of these manifestations of popular art, which form one of the characteristic features of our national habits.

There remains to be said something about the Class of Fine Arts of the Royal Academy of Sciences, of Letters and of Fine Arts of Belgium, which includes sections of painting, carving, engraving, architecture, music, and a section of Sciences and Letters as related to Fine Arts. Each class of the Academy proceeds itself to the election

of its members. Such appointments are subject to the approbation of the King. In this way the sections of the

ROYAL CONSERVATORY OF MUSIC, LIEGE.

Class of Fine Arts have secured the assistance of the most authorized and eminent representatives of Art in our country.

AGRICULTURE.

Organisation of the agricultural department.

The Agricultural Department is at present composed of the following services :—

- General Secretariate ;
- Direction of the General Accounts and of Pensions ;
- Administration of Agriculture ;
- Administration of Waters and Forests ;
- Administration of the Health Service, of Hygiene and of Municipal Highways Service ;
- Direction of Fine Arts.

The following Commissions are connected with the Agricultural Department :—

- The Superior Council of Agriculture ;
- The Superior Council of Forests ;
- The Superior Hippiic Council ;
- The Committee of Mariculture.
- The Commission for the Improvement of the Breeds of Swine ;
- The Commission of Fish Culture ;
- The Committee of Mytiliculture ;
- The Superior Council of Public Hygiene.

In pursuance of the regulations concerning the Veterinary Service, the veterinary inspectors may be convoked by the Minister or his Delegate in order to give their opinion on the business relating to epizootic diseases and the sanitary police of domestic animals.

In the provinces the Services of the Agricultural Department are as follows :—

- The Service of the Veterinary Inspectors ;
- The Service of the Agricultural Inspectors ;
- The Service of the State Agronomists ;
- The Service of the General Inspectors and Rangers of Waters and Forests ;
- The Service of the Councillors (male and female) of Dairies ;

The Agricultural Section of the State Commercial Museum;
 The Service of the State Laboratories of Analysis and of the
 Licensed Laboratories;
 The Chemical and Bacteriological State Institute (Gembloux);
 The Dairy Station annexed to the Agricultural State Institute;
 The Entomological Station annexed to the Agricultural State
 Institute;
 The State Botanical Garden;
 The Central State Vaccinogeneous Office.

The Budget of the Agricultural Department for the
 year 1904 reaches, as far as the ordinary expenses are
 concerned, the sum of 13,127,296 francs distributed as
 follows :—

Central Administration	fr. 385,700
Service of the State Agronomists and of the Experimental Fields.	203,200
Indemnities for animals slaughtered by order of the authorities.—Subsidies to the Mutual Assurance Socie- ties for cattle, &c.	1,650,000
Veterinary Service	253,000
Subsidies for the improvement of cattle.	660,000
Subsidies to the Official and to the Private Agricultural Societies.	330,000
Annual Agricultural Census.	86,000
Veterinary teaching	210,935
Agricultural Education	807,450
Service of the Waters and Forests	941,065
Agricultural Laboratories	252,510
Service of Health	520,000
Municipal Highways Service and Public Hygiene	4,593,000
Fine Arts	2,234,436

Agriculture.

« With respect to the fertility of the soil, Belgium has
 not been much favoured by nature. Of the total area,
 which is of 2,945,516 hectares, about one third or
 818,000 hectares belong to the great cimbrian plain, lean
 and unfertile sand; 420,000 hectares are taken up by the
 schisteous and barren ground of the Ardennes, and
 487,000 hectares by the cold clay of the Condroz. And so
 there remains only a little more than one third, or 944,000
 hectares of good soil.

» Notwithstanding these natural disadvantages, well
 directed human labour has made it the best cultivated and
 the most productive country of the world, and, what is more
 remarkable, Belgium is indebted for this agricultural supe-

AFTER THE SERVICE, IN THE CAMPINE, BY COURTEENS, MUSEUM OF BRUSSELS.

riority, to the marvellous culture of the least fertile part of its territory, the Flandres. »

These lines written by Emile de Laveleye, at the time of the International Exhibition and Congress of Paris ; in 1878, may be reprinted to day : they are just as true in 1904 as twenty-six years ago.

Belgium is above everything else, a land of small farming : economists quote it often as an instance of what the personal labour of the farmer cultivating with his own hands and those of his family can perform, when applying to a small plot all the resources of the most intensive farming. Out of the 829,625 exploitations covering the belgian territory, 784,939 have no more than 10 hectares ; only 923 farms possess more than 100 hectares.

Those small exploitations keep a numerous stock of cattle fed on the most rational principles, for which an enormous quantity of commercial food stuffs, oilcakes and meal is yearly purchased by our farmers.

The perfection which agriculture has reached in our flemish provinces is greatly owing to the large proportion of manual labour always more perfect than mechanical labour ; the soil is treated as garden-soil and brings forth as plentiful as, and more diversified crops than the products of the richest soils.

In the flemish part of the country the agricultural labourer devotes his leisure hours in winter-time to weaving at home ; his wife manufactures lace which is in great demand ; both cultivate a little plot of ground and feed one or two cows, a few goats and numerous rabbits intended for the London Market. Much attached to his ground and practising the simple habits and the tireless activity of his ancestors, the agricultural labourer has hitherto, and to his great advantage, kept aloft from the violent commotions which stirr the industrial populations.

Our labourers are much looked for in foreign parts, and especially in France where every year 45,000 belgians lend their assistance to the work of cultivating and harvesting the crops of beetroots and cereals.

Statistics.

The progress which for the few last years has been realised in the various branches of Belgian Agriculture is

immense; it is sufficient to consult the statistics to be convinced of it.

The average returns of most of the cultivated plants have increased to enormous rates; light is thrown on this fact by the figures which follow, and are borrowed from the statistical documents collected in 1846, 1856, 1866, 1880 and 1895.

PLANTS CULTIVATED	DESCRIPTION OF THE CROPS	AVERAGE RETURNS BY THE HECTARE IN				
		1846	1856	1866	1880	1895
Wheat	Grain in kilog.	1,435	1,679	1,418	1,529	1,931
Rye	Id.	1,326	1,475	1,569	1,422	1,786
Barley	Id.	2,001	2,171	1,895	1,746	2,149
Oats	Id.	1,404	1,522	1,664	1,614	1,759
Linseed . . .	Flax in kilog.	583	540	416	532	520
	Seed in hectol.	709	615	—	636	454
Tobacco . . .	Dry leaves, in kilog.	1,842	—	—	1,917	2,123
Hops	Cones in kilog.	1,172	—	1,237	1,060	1,316
Chicory . . .	Green roots, kilog.	17,853	—	15,789	17,330	24,713
Sugarbeets. .	Roots, kilog.	35,519	39,007	30,767	34,676	31,700
Foragebeets. .	Id.	29,000	—	29,000	32,284	44,730
Potatoes . . .	Tubers, kilog.	14,392	12,832	10,037	12,235	15,598
Lucern	Green forage.	21,033	—	—	26,903	26,083
Grass culture (Mowed meadows, pastures and or- chards).	Hay.	3,026	4,017	4,071	3,829	3,56*

These figures are the more significant as Belgian Agriculture has been compelled during the latter years to adapt its production rather to necessities of economical order than to the requirements and aptitudes of the soils it possesses. Many cultures have been abandoned in the grounds which were most fitted for them, and replaced by

(*) This average includes the average returns of 1892, which has proved a disastrous year for the production of fodder.

others which did not always find there the most favourable conditions to their success.

The increase of the returns is owing to a more judicious choice and to the bettering of the cultivated varieties, to the rational use of manure and to the improvement of the methods of culture.

* * *

Average price of grains and other agricultural commodities, on the regulating markets of Belgium in 1903.

DESIGNATION OF COMMODITIES	AVERAGE PRICE BY 100 KILOG	AVERAGE WEIGHT OF THE HECTOLITRE
	(francs)	
Wheat	16.26	77
Rye.	13.51	74
Meslin	14.42	75
Spelt	12.50	43
Buckwheat.	16.29	70
Oats	15.14	46
Barley	15.19	68
Peas	27.08	80
Horse beans	19.94	81
Linseed	27.12	67
Colzaseed	26.88	66

Potatoes	9.00	the 100 kilog.
Straw.	3.61	Id.
Hay.	6.04	Id.
Hops	98.52	the 50 kilog.
Raw flax	116.74	the 100 kilog.
Tobacco	188.83	Id.
Butter.	2.75	the kilog.

* * *

Under the influence of the economical conditions, our agriculture has been led to render the cattle speculations the prime object of its activity. The following figures

show the modifications introduced in the composition of the live stock.

KINDS OF ANIMALS	NUMBER OF CATTLE IN				
	1846	1856	1866	1880	1895
Horses	294,535	277,311	283,163	271,974	271,527
Bovine breeds	1,203,891	1,257,649	1,242,445	1,382,815	1,420,978
Sheep	662,508	583,485	658,097	365,400	235,722
Swine	494,564	458,418	632,301	646,375	1,163,133
Goats	110,060	--	197,138	248,755	257,669

Comparing those figures, one finds there is a slight decrease in the number of horses and a considerable reduction in the number of woolbearing stock.

The decrease of the number of horses is owing to the fact that these great producers of labour do not find employment in the small exploitations whereof the number never ceases to increase.

The sheep stock tends to disappear; it is a well known fact that the breeding of this kind of stock does not agree with the practice of intensive culture.

One finds on the other hand a considerable increase of the number of bovine beasts, of goats and above all of swine. The variations which indicate at the same time a new orientation of Agriculture, point out a visible increase of the well-being of the population.

What the figures relating to the numeric importance of the live stock cannot show, is : the deep changes introduced during the latter years in the practice of cattle speculation; the bettering of the breeds realised especially by selection, the rational feeding and the observance of the rules of hygiene; the increase of produce resulting from these practises. And as selection, rational manuring and improved cultural practises have caused a considerable increase in the returns of cultivated plants, in the same way, one may safely state that similar improvements applied to the animal organism have caused an enormous increase of produce. The value of this produce has increased as well, as is shown especially by the success

which the representatives of our breed of draft horses have gained.

Belgium exports yearly horses for a value of more than 30 millions of francs.

All the countries which practise the breeding of heavy draft horses have become tributary of Belgium. The German breeding in the first place draws large supplies from our breeders, while the Belgian horse is used at

BELGIAN DRAFT-HORSE.

various degrees to improve the breeds of draft horses in Holland, France, Sweden, Danemark, Austria, Hungary, the United-States, Russia and elsewhere.

The progress which we have pointed out is owing for a great share to the powerful impulse which it received from the various services depending from the Agricultural Department. The private initiative, the devotion of those which we call here « men of works » (*hommes d'œuvres*)

ON THE BANK OF THE SCHEDLT, BY VERWEZ, MUSEUM OF BRUSSELS.

may as well claim a large part in the raising of the first of our national industries. One of the most powerful instruments which has been brought to bear in this law is « Association. »

The aim towards which all the endeavours of the farmers, and those of all the industrials as well have to tend, is to produce in the best possible conditions, by the most advantageous purchase of the raw materials, by the

COWS OF THE CASSEL BREEDS (FLANDERS).

perfection of the means of producing and the most remunerative sale of the produce.

Amongst the Associations which have allowed the farmers, better to realise the first of these desiderata we may mention :—

1° *The Societies of Agricultural Credit*, caisses Raiffeisen, Schulze-Delitzsch Banks, and Agricultural Counting houses, which place at the farmers' disposal, in the most

advantageous conditions, the capital they need to acquire the commercial manures, the food for cattle, the improved machinery and implements and to stock again their stables.

The amount of loans granted in 1902 by these Societies under the various forms which they affect, reaches 3,592,283 francs.

2° *The Societies or Syndicates, for the purchase in common of seed, artificial manure, foodstuffs for cattle, and agricultural machinery*, offer to the farmers guarantees of genuineness and pecuniary

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FLEMISH DAIRY MAID, BRUSSELS.

sacted by these societies in 1902 reaches 14,902,781 francs and, on December 31st 1902, 52,228 farmers were participating to the advantages which they procure.

The *Credit Societies* and the *Syndicates of purchase*, while facilitating and rendering more advantageous the acquisition of the raw materials, contribute powerfully to improve the means of production by spreading the use of manure and artificial food, the use of machinery and the use of the most productive varieties of plants.

The *Domestic Animals Mortality Insurance Societies* afford to our farmers protection against the serious consequences which, in a land of small culture like ours,

result from the loss of cattle. Besides they decrease the risks of the possession of choice breeds and contribute in this way to the *improvement of the breeds*. The Societies of Assurance for Mortality of horses, bovine beasts, swine and goats were insuring in 1902 a number of animals representing a capital of 84,884,881 francs.

Amongst the Societies of which the special aim is to promote the sale of farm produce, we ought to mention in the very first place *Cooperative Dairies* instituted for the sale of milk and the manufacture and sale of butter and cheese. The number of members affiliated to these Societies reached 50,890 on December 31st 1902. The products sold by the Dairies are valued for 1902 at 7,514,729 francs.

Besides the Societies which we have mentioned and which procure to their members immediate material advantages, a great number contribute to the diffusion of agricultural progress by teaching, lectures, competitions, &c. Statistics of the Associations collected in 1902 give the following returns:

« MELOTTE » SKINNER

157 agricultural committees; 924 agricultural leagues; 250 apicultural societies; 163 horticultural societies; 62 avicultural societies; 312 syndicates for the bettering of bovine breeds.

Service of the Sanitary Police of domestic Animals.

In execution of the Act of December 30th 1882 on the Sanitary police of domestic animals, the Government has issued several regulations with the object of protecting horses and cattle against the propagation of contagious diseases.

These regulations order a whole series of measures with a view of detaining the domestic animals in the country and subjecting to a meticulous control the importation of animals of foreign origin.

In order to facilitate the execution of the measures applicable to the animals which are in the country, the Government grants sometimes very high indemnities, in the case of slaughter of animals stricken or suspected stricken with contagious diseases. It grants also indemnities in certain cases of animals being recognised unfit for the consummation (bovine and porcine tuberculosis).

The rate of such indemnities and the conditions to which their allocation is subordinate are specified by Royal decrees.

The application of the measures of sanitary police has produced very happy consequences for the farmers' wealth such as the complete disappearance of the bovine plague and of the contagious pleuropneumonia, the almost complete disappearance of glanders and farcin, &c.

A measure innovated recently but very important with regard to the sanitary police of domestic animals specially, and to public hygiene generally, consists in the removal and destruction of the carcasses of animals rendered unfit for consummation through contagious disease.

It has long since been demonstrated, there is some danger from the point of view of the interests of agriculture and public hygiene, to bury the carcasses tainted with contagious diseases.

The legislator therefore authorizes, by an Act of April 4th 1900, the Minister of Agriculture to contract for the undertaking of the removal and destruction of these carcasses in special knackers' yards, and a Royal decree dated December 31st, 1900 grants to the Minister the necessary powers to decree a prohibition to bury them.

This prohibition has already been decreed in several parts of the country, and this service of which Belgium may claim the initiative - it does not exist in any other country - will be extended in succession to the whole Kingdom.

The carcasses are removed, free of expense for the owners, by a service specially organised with this view, and destroyed by fire in the above mentioned works.

The propagation of certain diseases of the cattle cannot be combatted with efficacy except by preventive vaccination. Such is namely the case with the anthracic affections of bovine beasts and swine fever. The Government delivers gratuitly the necessary vaccinating stuffs to the approved veterinaries, directed on request of the owners to inoculate their animals against those affections.

The Government delivers also, free of charge :—

1° The tuberculine required to test the cattle with regard to the existence of tuberculosis;

2° The malleine capable of ascertaining the existence of glanders.

In order to facilitate the execution of the Acts and regulations on the sanitary police of domestic animals, the country has been divided into fifteen veterinary circumscriptions. Each of these is attended by an inspector. Besides, a veterinary inspector is attached to the Agricultural Department. Those whom the matter concerns can apply to these officers either by writing or verbally, in order to obtain information concerning the application of the various regulations on the matter.

All the veterinary surgeons are admitted to cooperate to the sanitary police of domestic animals, within the boundaries traced by the said regulations.

The Service of the State Agronomists.

The State Agronomists hold themselves at the disposal of the agricultural public to give them, free of charge, all the desirable technical informations, by writing and verbally on the days of their consultations on the markets.

The days, hours and places for consultations on the markets are stated on the sticking-bills diffused in all agricultural localities, and in the news-papers of the provincial agricultural societies.

BELGIAN BREED OF THE CENTRAL DISTRICT.

When requested by the farmers the Agronomists visit the exploitations in order to give advice on the spot.

They organise at the expense of the State cultural experiences and demonstrative trials on the feeding of the cattle.

Their mission is also to teach the farmers the advantages of association and to put them in a position to organise themselves for the purchase or the sale of the goods, for the bettering of the cattle, &c.

On the occasion of the general agricultural census of 1895 the State Agronomists have been directed to redact the monographs of the different regions of Belgium.

Agricultural Education in Belgium.

The commencement of the agricultural teaching in Belgium dates from the year 1849; the official agricultural institutions were reorganised in 1860 and received their present organisation by the Act of April 4th 1890.

In a parallell line with the schools of the State, numerous private schools were developed including teaching of every degree : most of these establishments received official subsidies.

Finally the instruction of the farmers made a marked progress since the foundation of syndicates of purchase, cooperative dairies, banks of credit, &c. The periodical meetings of the members of these Societies constitute real conferences where the farmers discuss new methods of culture and teach one another.

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1° *Elementary Education.* In most of the elementary schools, notions of Agriculture have been inscribed in the Programme : different means are used in order to awake an interest for agriculture with master and pupil, especially by way of premiums, by organising societies for the protection of insectivorous birds, for the destruction of insects, &c.

Many masters of elementary schools are provided with

small collections of seeds, manures, models of implements, pictures, &c.

2° Secondary Education. This education is greatly extended in Belgium; it embraces Agriculture properly so called and Horticulture, and is intended for young men as well as for young girls.

The Belgian State possesses a Secondary School of practical Agriculture at Huy, and two Secondary Schools of Horticulture and Agriculture at Ghent and Vilvorde. Among private institutions the Agricultural School of the Brothers of the Christian Learning at Carlsbourg teaches agriculture, horticulture and brewery, by means of very complete installations; the Agricultural Institute of La Louvière is the competitor of the Carlsbourg School and receives like the former a subsidy from the State.

A complete Secondary Agricultural Education is equally imparted in a great number of private educational establishments, which receive an official subsidy, subject to a minimum number of pupils immatriculated in the agricultural section, to the presence of the implements (collections, &c.) for teaching by intuition, and the observation of a stated programma. Several of these Institutions possess a very complete installation. Free Schools of arboriculture and horticulture, also subsidized, are operative in Liege, Tournai, Mons and Carlsbourg.

Special agricultural courses are given in several State Secondary Schools and Atheneums, by lecturers appointed by the Agricultural Department. Similar courses are organised in private Institutes. Those courses do not, as a rule, comprise more than about thirty lessons.

It follows that Secondary Agricultural Education for young men is realised in a very complete manner without causing much expense to the Government. The State endeavours to call forth and to encourage as much as possible, private initiative, while it reserves the right of controlling the teaching, through the medium of its official Agronomists and Agricultural inspectors.

Secondary Agricultural Education for young girls is imparted in about ten domestic training Schools (*écoles ménagères*) generally very well fitted, created by private persons and subsidized by the State.

3° Higher Education is imparted at the State Agricul-

tural School of Gembloux, founded in 1861 and kept at the expense of the State.

A free Agronomic non subsidized Institute, belonging to the Faculty of Sciences of the University of Louvain, has been founded in 1878 on the model of the National Agronomic Institute of Paris.

Those two establishments issue the diploma of Agricul-

STATE AGRICULTURAL SCHOOL, OF GEMBOUX.

tural Engineer. The curriculum lasts three years, a fourth year which is not compulsory prepares to specialities : agronomy, sylviculture, agricultural industries.

To Agricultural Education, may be linked the State School of Veterinary Medicine, of Cureghem, the unique Veterinary School in the Kingdom.

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Education through public lectures. It is the mode of Agricultural teaching of which the fruits are the most immediate. It is much diffused in Belgium and it has raised the technical education of the farmer to a very high level. Owing to the same, the use of artificial manure, of oil cakes and various foods was introduced, the utility of machinery was more generally admitted, the farmers understood the deficiencies of their education and the practical advantages of the new methods, of the asso-

ciation of credit, savings, insurance, &c., which were recommended to them in those lectures.

The courses organised by the State, are given by agricultural engineers or by teachers; an official special jury delivers, after examination, a diploma of certificated agricultural lecturer, to the persons who do not possess a diploma of agricultural engineer. However, the greatest endeavours are made to unify the education, and to entrust with it such as are entitled by a complete agricultural curriculum, and namely agricultural engineers.

The free agricultural associations also organize lectures and even lectures delivered by the farmers themselves : this is mutual teaching. The system works very regularly in certain associations and gives the best results.

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Special courses. Various special courses are organised to teach arboriculture, market gardening, apiculture, aviculture and farrier's craft.

The teaching of dairy-management is organised in a complete manner. It includes two permanent Schools for young men : Borsbeek and Oplinter, and schools—generally temporary—for young girls; besides numerous lectures are delivered all over the country. This teaching has powerfully contributed to the development of cooperative dairies in Belgium.

Specialists, bearing the title of « Dairy Councillors, » are directed by the State to contribute to the dairy teaching and to supply those whom it concerns, with all information required.

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Teaching on agricultural industries is given at the superior Institutes of Louvain and Gembloux.

Two Schools for manufacturing Sugar, are established at Waremmé and Glons.

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Every three years the Agricultural Department issues a report on the state of the veterinary and agricultural

Education, containing the most minute details on the organisation and the progress of this education.

Chemical and bacteriological State Institute.

The chemical and bacteriological State Institute, which is established at Gembloux, is provided with a complete equipment and a body of chemists specially entrusted with the studies, experiences and analyses required by the Agricultural Department.

Laboratories of analysis placed at the public's disposal, exist at Antwerp, Hasselt, Liege, Gembloux, Louvain and Mons; metropolitan and provincial laboratories exist at Bruges, Roulers and Courtrai, in the province of West Flanders.

The analyses are performed at a much reduced price and even free of charge for the farmers who purchase a sufficient quantity of agricultural raw material. This measure has very favourably influenced the healthyfying of the trade of manures.

Horticulture and Arboriculture.

I. IMPLEMENTS AND PROCESSES OF HORTICULTURE AND OF ARBORICULTURE.

Great improvements have been realised in the construction of hothouses and glass shelters, and this industry occupies at present important factories. The deficiencies which were formerly reproached to the iron hot houses, are lessened for a great part when this metal is combined with wood.

The use of the thermosyphon has been generalised, and the form of the boilers varies infinitely. When the incrustations caused by the calcareous waters are not to be feared, preference is given to the tubular system.

In the places where gas is available at a low price the heating of the thermosyphons by its means has little by little extended itself.

Certain great horticultural establishments produce heat by vapour either by radiation or by insufflation of hot air

and vapour in porous brick conduits placed beneath the shelves. This system has extended itself since the hothouses with manifold roofs were found out.

The development of the establishments of great horticultural production, has necessitated the construction of new installations. The hothouses of small dimensions have been replaced by hothouses with several bays. They have an average width of 6 meters by 30 meters length. The junction of the bays forming gutters is supported by an arcade of T iron, whereof the two uprights are at a distance of 0^m,60. All round the hot house is fixed a shelf 1 meter wide. The paths are 0^m,90 wide.

The roofings of the hot houses have undergone few modifications. The shadow is obtained by means of screen of light wood or cheap cloth. Often does a coat of whitewash give satisfaction.

II. TREES, SHRUBS, ORNAMENTAL PLANTS AND FLOWERS.

Garden architecture and their ornamentation are in great progress. The principal towns of the Kingdom vie with each other for the beautifying of their public walks. The courses given in the horticultural schools have formed a certain number of landscape architects, clever in taking advantage of the natural movements of the ground or imparting to the latter the forms appropriated to the size and situation of the ground. The great extension which has been given to the plantations in our principal cities, did not have the sole consequence of improving the hygienic conditions of the populous centres, but it has developed the taste for plants, through the utilisation of numerous kinds with elegant forms, attractive foliage, and brilliant blossoms.

The culture of plants has always been popular in Belgium. Already in 1366 did the sheriffs of the town of Ghent assign places on the market to those who were in the trade. At present the sale of flowers has taken an astonishing development in all the towns. Special establishments have been created with a view of supplying them to the markets and shops, getting each day more numerous.

Every day are exhibited for sale quantities of flowers

coming from the south of France and which find numerous purchasers.

The figure of the importations of plants and flowers was of 1,445,272 francs in 1898, and the figure of the exporta-

HOTHOUSES OF THE STATE'S HORTICULTURAL SCHOOL, OF VILVORDE.

tions 5,990,913 francs. The towns of Ghent, Brussels, Bruges and the communes of Saint-Gilles, Loochristy, Auderghem, &c., are those which export the most flowers and specially orchids.

III. CONSERVATORY PLANTS, &c.

The trade of cheap plants, such as certain Palmtrees, the Auracarias, Aspidistra, Ficus, Azaleas, Camellias, Ferns, Ericas, &c., has taken such remarkable extension, that their culture has become a real industry. The horticultors endeavour to produce rapidly and economically the kinds which are most demanded. Therefrom has resulted a complete transformation and a specialisation of the Belgian cultures. Formerly did the horticultors never

shrink from any difficulty in order to produce fine specimens of plants, of very different kinds and often of a difficult or ungrateful culture. At that time horticulture was rather an art, while to-day it has taken an industrial character. Purchasers prefer freshness and « show » rather than rarity. Hence creation of large establishments, provided with a plant fit to assure the most advantageous and at the same time the most economical conditions of light, heat and humidity. Assisted by their knowledge of vegetable physiology, the horticultors are aware of the needs of the plants, succeed in multiplying

STATE'S BOTANIC GARDEN, BRUSSELS.

them with certainty without any hesitation and in assuring their rapid development.

The principal centre of the great horticultural culture is always in the suburbs of Ghent. In less than ten years the number of establishments has more than duplicated there. In 1889, there were 108 establishments occupying about 300 workmen and gardeners. In 1898, statistics returned 279 establishments occupying more than 600 workmen. These figures include only horticultors subject to the tax of *patente*, but besides there is a multitude of small installations whereof the owners devote themselves to the culture of certain kinds of plants without the assistance of strangers to the family. In the environs of Brussels and of Bruges, horticulture has taken a similar

expansion. Commercial cultures are plentiful there. The same movement has strengthened itself around Liege, Antwerp and other towns also. In consequence, the traveller who goes through Belgium by railway, can see entire fields given up to the culture of specialities such as : Azaleas, Begonias, Tuberroses, Spireas, Coniferous plants, Rhododendrons, situate in proximity with small farms to which are annexed two or three hothouses. All those whom the social problems preoccupy, are interested in this marvellous development of an industry which creates the union of the vegetable factory and the domestic hearth.

The progress of horticulture has been favoured by the development of education. Besides the State schools at Ghent and Vilvorde, other schools have been established at Mons, at Tournai, at Liege and at Carlsbourg. Numerous lectures, and practical lessons initiate the public to the proceedings, to the methods of the science of the cultures for which the Belgian farmer possesses special abilities. He understands the commercial movement and the necessities of the market. It is not unfrequent to see hothouses devoted one year to the culture of Palms or Ferns, filled the following year with Azaleas Orchids or other select plants.

The Societies of horticulture have contributed for a large measure to the diffusion of the horticultural science and have spread everywhere the love of flowers. They organise exhibitions, they open competitions institute meetings which gather the amateurs and the professionals. One of the oldest is the Royal Society of Agriculture and Botany of Ghent, which, independently of its ordinary expositions, invites every five years to its international Floralia, the producers of the whole world. Besides this Society specially devoted to the horticultural art, a special organism : « The Syndical Chamber of the Belgian Horticultors, » has for object to protect and to watch over the general interests of the horticultural industry.

Finally, more than thirty Societies having their seat in the capital and suburbs and in the principal towns and communes of the various provinces, are constantly giving proofs of vitality and activity, through their exhibitions of flowers, fruit, vegetables, through their lectures and through their distributions of seeds and plants.

A cause of prosperity for the horticultural industry

resides in the ever-increasing extension of the commercial relations with colonial countries.

More than half a century ago a horticultor of Ghent, Aug. Van Geert, supplied Liberia with Coffee plants. At present several important establishments endeavour to multiply and prepare certain sorts intended for colonial plantations. Plants of India Rubber, Cacao, Cinchona, Coffee, &c., are reared there by the thousands, intended for the colonies and being the object of important commercial transactions.

Independently from the establishments we have just mentioned, there are in Belgium a great number of conservatories containing rich and precious collections. Amongst the public establishments, we shall name the State Botanical Garden of Brussels, the Botanical Garden of the University of Liege, the schools of Ghent and of Vilvorde. Different private citizens possess also remarkable cultures. Those of the Desmène of Lacken, where His Majesty the King of the Belgians has gathered a collection of plants of exceptional merit and splendour, occupy the first place.

IV. MARKET GARDEN PLANTS.

According to the last census, the market gardens were covering in Belgium 41,868 hectares and the orchards 47,591 hectares. These figures do not include all the extent of land devoted to market gardening, a great number of vegetables being comprised amongst the agricultural cultures. An increase of 2000 hectares has been ascertained during the last ten years. Nevertheless, and notwithstanding this increase, Belgium does not produce sufficient vegetables for its consumption. In 1898, 19,760,285 kilog. have been imported, representing a value of 2,568,837 francs. The exports have reached 17,629,991 kilog. valued 2,291,899 francs.

V. FRUIT TREES AND FRUIT.

The increase of orchards is owing to the persevering endeavours of the Government and of the Societies, in order to develop in the rural populations theoretical and practical knowledge of the culture of fruit trees. The choice of trees has become more judicious, their planting

more careful, their rearing more rational. The orchards are planted principally with apple and pear trees. The apples are the object of an export trade which reached in 1898, 5,848,663 kilog., valued 1,286,706 francs.

The culture of grapes under glass, occupies the activity of the inhabitants of various localities. It was born at Hoeylaert and from there it spread itself in the neighbouring communities and even in other provinces. It is fully sufficient for the national consumption and, notwithstanding the almost prohibitive custom taxes which burthen these products in certain countries, the figure of exports of fresh grapes rose in 1902 to 430,313 kilog. valued 990,000 francs.

In certain parts of the country, the strawberries, plums and currants are the object of an important trade and fetch very remunerative prices.

VI. HORTICULTURAL GRAIN, SEEDS AND PLANTS AND NURSERIES.

The trade of grain is in the hands of numerous shopkeepers. A bureau of control for the seeds of cereals, forage plants, &c., is established at the Agricultural Institute of Gembloux which is also commissioned to analyse the various manures. Most of the flowerseeds come from foreign countries. Numerous nurseries supply on advantageous terms fruit trees, ornamental trees and shrubs, and essences intended for planting on the roads and for stocking forests.

WATERS AND FORESTS.

Considerable interests are connected with the proper management of the forest-lands. Their produce is demanded by a great number of manufactories, and, by procuring fuel, they play a certain part in domestic economy. Forests are useful to agriculture. As strategical points, they can be advantageous to the national defence. On the other hand, when contained within rational limits, they equalize temperature, moderate the action of violent winds, maintain a convenient degree of freshness, supply the springs, scatter the torrential rain, and, on the coasts, they prevent the vegetable soil from being swept off into the valleys. Finally, the forests, which offer a safe investment, minister also to our pleasures; the hunter finds them teeming with game, the artist and tourist with picturesque scenery and the naturalist with rare animals or plants.

Consequently, since the remotest ages, the preservation of the forests has been considered as being of public interest. The legislation on forestry of 1854, known by the name of « Forestry Code, » has consecrated this principle by placing under a special rule « Forestry rule » the woods belonging to the State, the communes and the public establishments.

But if the legislator has judged proper to exercise a right of guardianship on the woods belonging to these three last classes of landowners, he has nevertheless entirely freed those belonging to private owners. Still, the absolute individual freedom granted to the latter, to manage, and to dispose of their woods, received a slight blow from the royal decree of Juli 24th 1901 which compels the owners of forests, whosoever they may be, to take

special measures in order to prevent the invasion of insects injurious to forests.

This is the only important restriction affecting the right of property, and nothing limits or prohibits the destruction of private forests in Belgium. Since 1897, the Government has acknowledged the necessity of reconstituting the State's demesne which in former times was inconsiderately alienated in parts. Whenever general interest claimed such measure, or when circumstances allowed it on fair financial terms, the State has purchased forests or uncultivated lands in order to give them up to forest-culture. To this end a sum of 3,523,000 francs has hitherto been affected to the purchase of private property, and in this way the national Forestry demesne has been increased by 3473 hectares.

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According to the agricultural statistics of 1895, Belgian forestry property is distributed as follows between the different owners :—

	Hect. a. c.
State	25,041.37
Communes	158,181.49
Public establishments	6,951.79
Private owners	331,310.13
	<hr/> 521,484.78

The territorial extent of Belgium being according to the cadastre of 1850 : 2,945,506 h. 30 a. 94 c., the proportion of woods and forests in general is about one sixth.

The forests of the State represent about the 117th part of the territory, those of the Communes and of the public establishments the 18th and those of the private owners about the 9th part.

The same statistics show also there are still in Belgium more than 169,000 hectares of uncultivated lands, whereof 105,000 belong to private owners, 58,000 to the Communes and public establishments, and about 7000 to the State. The latter comprise the large extent of grounds encircling Penitentiary establishments and those which constitute the camp of Beverloo.

The cultivation of these barren lands belonging to the Communes or to private people, escape in reality to every

AN OAK IN THE FOREST OF SOIGNES, NEAR BRUSSELS.

kind of direct action of the public powers. Still the latter make great sacrifices in order to induce the Communes to improve those large extents of heath, which can, through a suitable cultivation, become the source of large profits. Important subsidies of which the minimum covers half the total expense are granted to the communes which give up to forestry the waste lands they possess. Besides the forest agents give yearly in their cantonments sylvicultural lectures having specially for object to activate the cultivation of waste lands.

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The management of the woods subject to forestry rule (belonging to the State, Communes and public Establishments) is entrusted to the Forestry Administration, which is also competent on everything pertaining to waste grounds, hunting and fishing.

In this respect, the belgian territory is divided into eleven forestry inspections, comprising generally three cantonments each, at the head of which is a general keeper or sub-inspector. Each cantonment is in its turn subdivided in brigades comprising a certain number of sorting gangs of which the supervision is committed to officials or forest keepers.

Besides this provincial administration, there is in Brussels a central administration pertaining to the Agricultural Departments.

In order to succeed in propagating good notions of Forestry Science, a service of investigations and consultations has been created at the Central Administration and the Forestry agents are at the disposal of private inquirers, to give the latter every information relating to the treatment of the woods.

Since 1876 the office of forestry agents is fulfilled by agricultural engineers.

Appointed by choice till 1893, they have been over since recruited by way of competition, and since 1900 none are admitted to compete but agricultural engineers having attended successfully the courses of the forestry section organised at the State Agricultural Institute of Gembloux or at the Agronomical Institute of Louvain.

BEECH-TREES IN THE FOREST OF SOIGNES.

On the other hand great endeavours are made to raise the intellectual level of the forest keepers. Besides the sylvicultural courses of Bouillon and of Diest, which are reserved to soldiers only, the Government organizes in the forestry regions of the country, travelling courses of sylviculture which allow young men to acquire the Forestry Certificate, at present required to be appointed forest keeper.

A royal-decree of February 22nd 1893, has instituted a consulting Committee bearing the title of *Superior Council of Forests*, of which the members represent, as far as possible, the various regions in proportion with their importance in forests.

Hunting.

Legislation. The exercise of the right of hunting is ruled by the Act of February 28th 1882.

As stated by this Act, everybody may hunt. Hunting is inherent to ownership and is no longer the privilege of a caste, but is allowed to everyone. The sole conditions required is to possess hunting grounds and to justify of a gun-licence when shooting is intended, and of a special permission for hunting with the greyhound.

The cost of such licences, which may and must, according to the case, be refused to a certain class of people, is fixed at 35 francs, independently of a provincial tax of 10 francs.

Licences are personal and valid for one year from July 1st to June 30th of the next year.

Hunting is prohibited except within the periods fixed every year by the Government; the object of this restriction being to secure the reproduction of the game. Every landlord has a right to repell even with fire arms the wild beasts which damage his property.

Hunting is reserved to the Crown in the forests of Soignes, of St.-Hubert and of Hertogenwald, and in the estates bordering on the Demesne of Ardenne.

An Act of April 4th 1900, rules the destruction of boars and of rabbits which in certain region have become a real plague for agriculture.

Finally regulations of August 14th 1900 foresee the

destruction, the hunting, the sale, the purchase, the conveying and the peddling, of insectivorous birds, of their eggs and their broods.

Statistics. According to the general census of 1895, the territory on which the right of hunting can be exercised comprises :—

Ordinary cultures	1,916,690 hectares.
Woods	521,495 "
Waste lands	169,329 "
	<hr/> 2,607,514 hectares.

AVENUE OF THE DUKE OF AREMBERG'S CASTLE, AT CHEVERLÉ, NEAR LOUVAIN.

To this extent ought to be added the area occupied by the sea coast, the canals, the lakes and the water courses.

Hunting and snare-laying in the woods produce an annual income of about one million of francs or about 2 francs per hectare. Official statistics do not indicate such income for ordinary cultures nor for waste lands.

The taxes paid for gun-licences have reached

697,185 francs. They show a marked progression as will be seen from the following table :—

YEARS.	LICENCES DELIVERED.	TAXES PAID	
		TO THE STATE.	TO THE PROVINCE.
		(francs)	(francs)
1842	5,666	198,310	56,660
1852	8,418	294,630	84,180
1862	10,573	370,053	105,730
1872	10,827	378,495	108,270
1882	11,291	393,185	112,910
1892	13,202	462,070	132,020
1902	15,493	542,255	154,930

They commence to busy themselves seriously with restocking the forests. In 1903 there have been imported and let loose in the country :—

- 1° 1978 pheasants;
- 2° 912 partridges;
- 3° 328 hares;
- 4° 13 roebucks;
- 5° 4 deer.

17,575 eggs of pheasants and 740 eggs of partridges have also been imported. Moreover the breeding of these birds is carried on in our country on a very large scale, and it is hoped that the results of the re-stocking will soon be appreciable.

Besides we have to mention the acclimatization of a new game : namely the scotch grouse, which was introduced a few years since in the forest of Hertogenwald and in the neighbouring waste lands.

River Fishing.

The Administration of Waters and Forests, has among its attributions river fishing and fishculture, and the supervision of the laws and decrees ruling this matter.

There is besides, at the Agricultural Department, a Commission of Pisciculture. This college gives its opinion on important questions relating to aquiculture. It is

composed of piscicultors and of competent persons belonging to the various regions of the country.

An official report published in 1866 ascertained that our rivers were almost entirely deprived of fish. Ever since the Government has made great endeavours to afford remedies to this woful situation.

1° It has obtained the voting :—

(a) Of the Act of January 19th 1883, which coordinates and confirms the old dispositions taken for preserving the fish, and leaves to the Executive power the care to determine, according to the necessities, the periods, sea-

MECHLIN. — ANCIENT HOUSES. — HOUSE OF THE FISHERMEN'S GUILD « THE SALMON »

sons and hours of prohibition, and the devices and appliances which are forbidden.

(b) Of the Act of July 5th 1899, amending the former and instituting namely the fishing licence.

It attributes on good grounds a capital importance to a proper organisation of the supervision of fishing and such is the principal aim of this Act.

2° It endeavours to prevent pollution of the waters, but

this is a difficult task in a country so much given up as ours, to industrial pursuits.

3° It restocks the rivers and ponds by throwing in fry of the following kinds :—

Common salmon; California salmon; sedentary salmon; graylings; brook graylings or fountain trout; trout of the lakes; Scotch trout; rainbow trout; common trout; common carp; mirror carp; leather carp; American perch; zander, cat-fish, &c.

4° It studies the means of establishing at the various dams of the basin of the Meuse, passages or salmon-ladders, to enable the salmonides to reascend towards the spawning grounds, were they were born or deposited at the stage of fry.

No system has given hitherto satisfactory results. New experiments will be attempted very soon.

Finally a Franco-Hollando-Belgian International Commission appointed to inquire upon the means of re-stocking

the basin of the Meuse, has pointed out the necessity of regulating fishing in Holland so as not to prevent entirely the reascending of the parent fish coming from the sea.

Most of these measures taken by the Government reach their aim. The consumption of fresh-water fish has considerably increased and the trade follows an ascending progression. For the last ten years the trade of fresh-water fish has grown at least twenty times more important.

The exportation of live edible carps has been acquiring some importance for the last few years.

Sea Fishing.

Following the Belgian sea coast from the French borders to the Dutch borders we meet in succession the following sea ports : La Panne, Coxyde, Oost Dunkerke, Nieuport, Ostend, Blankenberghe and Heyst.

Some years ago, a careening dock has been built by the

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namely within 3 miles from the lowside line.

Since 1885, Ostend has been endowed with a great

number of steam-trawlers. Previous to that time and only since 1883, there were only two steamers. At present there are several Companies for steamfishing. There are besides private shipowners and associations possessing steamers.

The motive power of the steam-trawlers is of about 40 to 60 nominal H. P.; their tonnage is on an average from 60 to 80 tons. Their crew is composed—besides the master,—of 5 or 6 fishermen, of a first and often a second engineer and of one or two firemen.

Never has the consumption of fish been so large as it is

FISHERMAN'S BOATS IN THE DOCKS, OSTENDE.

at the present time. Formerly fresh sea-fish, was almost unknown in the inner country. At present owing to the rapidity and the facility of the means of conveyance and to the multiplication of telegraphic and telephonic wires and, accordingly, owing to the rapidity of transmission of offers and demands, sea-fish constitutes an important commercial commodity for the populous centres even the most remote from the sea-coast. If the exportation of the fisheries' products to the principal towns of Europe is con-

siderable, consumption does nevertheless not fail to follow an ascending progression in the inner country. Each town of some importance has at present its fish-market; the fishmonger-shops multiply and the bills of fare of the restaurants show regularly one or more fish courses.

The market of Ostend is one of the most important of the continent. The amount of its transactions varies between 3 1/2 and 4 1/2 millions of francs yearly.

The Steam-trawlers contribute for a large share to the supply of the market. The french, english and dutch fishermen arrive regularly at Ostend to sell their wares on account of the great advantage they find there, the importation of fish being quite free. In Ostend foreign fishermen dispose gratuitly of a very convenient tidal dock joining the market, which is connected with a railway running opposite one of the gates. On the other hand the foreign fishing-boats are not compelled neither at their entrance nor at their exit, to take a pilot on board, and if they judge his presence useful, which happens very rarely, they get the benefit of a reduction of 50 per cent. on the tariff of general navigation. Custom-house formalities for fishing-boats are of the plainest and the easiest to perform. Finally, considering the importance of the market where fishmongers as well from the inner country as from foreign parts, find always a sufficiency of wares of the most various description; considering also the excellent State railway equipment comprising frigorific cars specially fitted up to convey sea-fish; owing to the rapidity of conveyance at the low rate of the special tariffs for the expedition of fresh fish, orders for sale are always numerous and important, fish fetches a remunerative price, and expeditions are made in all directions even to Russia itself.

The expeditions of fish by railway from the various ports of the sea-coast, may be estimated on an average at nearly 12 millions of kilogrammes yearly. Eight millions of these remain in Belgium; 800,000 kilog. go to Germany, and the remainder to other countries.

In the figures we have mentioned is not comprised the more and more considerable traffic of oysters, mussels, shrimps and prawns.

For a certain number of years already, oyster breeding has taken a great extension at Ostende; Blankenberghe

follows close; at Nieuport very satisfactory experiments have been made.

Owing to its superior quality, the royal oyster of Ostend is known at present in all Europe. Germany especially constitutes a very important market for this commodity.

The waters of Ostend, Blankenberghe and Nieuport are admirably suited to the fattening of the aristocratic mollusk : for the quality of the water makes the quality of the oyster. The oyster-beds are supplied simultaneously with fresh and saltwater; the suitable proportion of their mixture is of the utmost importance; the organic matters and the infinitely small particles which are contained in fresh water constitute the food of the oyster.

Let us also mention the ever-increasing exportation of ordinary and spiny lobsters, toward Paris and Germany. Year

FISHERMAN'S BOAT, BLANKENBERGHE.

after year this trade is getting more important.

Marine Aquiculture is connected with the Agricultural Department, Administration of Waters and Forests. A Committee of Mariculture instituted in this Department proposes the measures which ought to be taken and is consulted on whatsoever concerns sea-fishing.

Three local committees including representatives of all our fishing ports, issue a yearly report on the situation of this industry in their circumscription.

HYGIENE.

Organisation of the Service of Public Hygiene.

The administration of the central Service of Health and Hygiene has among its attributions whatever concerns the health service properly so called, viz. the questions relating to the exercise of the different branches of the art of healing, to the medical police, to the inspection of dispensaries and depositories for medicines, and also the questions concerning public Hygiene : measures to prevent the outbreak and combat the propagation of epidemic diseases; measures of defense against transmissible diseases coming from foreign parts; supervision of the manufacture and the trade of food products; police of certain unsalubrious or inconvenient establishments, examination—with regard to salubrity and pecuniary intervention of the State—of projects for distributions of water, for wells, sewers, cemeteries, &c., &c.

THE MINERAL SPRING 'LE POUHON', SPA.

Independently of the cooperation which the provincial and communal administrations lend to it, the administration of the Service of Health and Hygiene is assisted in its mission by the following organisms :

(a) The Royal Academy of Medicine, which is committed specially with the reply to the questions made by the Government, and to study and investigate questions calcu-

lated to contribute to the progress of the different branches of the art of healing. It comprises a section of which the special object is hygiene and epidemics;

(b) The superior Council of public Hygiene, of which the mission is to study and investigate whatsoever is likely to contribute to the progress of hygiene, to reply to the demands of advice addressed to them by the Government especially where the medical and sanitary police is concerned; the measures to take in order to prevent and combat the epidemics; the projects for constructing

BATHINGS' HALL, SPA.

hospitals and alms-houses; the rules of the classed establishments, the examination of the reports of the medical commissions; the questions concerning the workmen's dwellings, the cemeteries, sewers, drinkable waters, the healthifying of localities, &c., &c.

(c) The provincial medical commissions, 17 in number, composed of 4 physicians and 3 pharmaceutical chemists appointed by the King from a twofold list of candidates elected by the practitioners of each district, and besides of one president, one secretary, one civil engineer, one

THE ORLEANS PROMENADE, SPA.

architect and one veterinary surgeon directly appointed by the King.

The medical Commissions, instituted by the Act of March 12th 1818, and reorganised by the Royal Decrees of May 31st 1880 and February 28th 1895, are directed to superintend the various branches of the art of healing and to watch over whatsoever concerns public health. They give their opinion on the projected hygienic works; — on the erection of hospitals and houses of refuge; — on the demands for erecting unhealthy establishments; — they are charged with everything concerning the prophylaxy of contagious diseases, and agree with the local authorities on the measures to be applied to stop the propagation of such diseases.

They are assisted in their mission by local medical commissions, local committees of public salubrity, correspondents appointed in all parts of the kingdom, and committees of patronage for workmen's dwellings.

(d) The sanitary Commissions of the Harbours, instituted at Antwerp, Ostend, Nieuport and Ghent and which are to enforce the application of the defensive measures against the importation, by way of sea, of contagious diseases.

(e) Finally, inspectors connected with the Central Administration, sanitary agents of the harbours, inspectors of the manufacture and trade of food products, inspectors of chemists' shops and official or approved laboratories for analysis of food products and medicines.

The inspectors connected with the central administration are entrusted with the office of watching over the execution of the laws, regulations and decrees concerning unhealthy establishments under the jurisdiction of the administration of the service of health and hygiene; they exercise their supervision over all classed establishments so far as its object is the exterior salubrity and the relations between hygiene and the regulations on labour.

To the sanitary agents of the harbours is committed the care of visiting the vessels and applying all measures of insulation and disinfection prescribed by the sanitary regulations.

The inspectors of the manufacture and trade of food products watch over the execution of the legal dispositions regulating the falsification of food products.

The inspectors of the chemist's shops fulfil the same office with regard to the medicines and medicinal products. They inspect periodically the chemist and druggist's shops and the depositories for medicines.

In virtue of the sanitary Act of July 18th 1831, Royal Decrees have organized the defence of the country against the diseases of pestilential kind : compulsory declaration of cases of cholera and plague (July 30th 1893 and November 14th 1899); measures of defence against clothes, rags, &c.,

ON THE BEACH, OSTEND.

contaminated by patients stricken with cholera (July 30th 1893); supervision of barges during epidemics of cholera (August 14th 1893); measures to be taken on the land and sea borders against goods proceeding from contaminated countries or territorial districts (July 15th 1895 for the cholera, — April 5th 1897 for the plague). Medical visits, insulation and disinfection of passengers and crews — preventive measures to apply with regard to travellers arriving by railway, to railway carriages and waggons; — treatment to apply to certain commodities considered as being suspicious. Organisation of the sanitary service of the harbours and seacoasts; institution of sanitary stations

at Doel, Ostend, Nieuport, Selzaete and Ghent; verification of the bills of health (February 8th 1897).

The sanitary station of Doel, which defends the harbour of Antwerp, is entirely equipped according to the prescriptions of the International Sanitary Conventions. It possesses steamships intended to convey the agents on board the ships, pontoons supplied with stoves for disinfecting; implements for disinfection by soaking, by sublimate, and by the action of gaseous formic aldehyde; a lazaretto, large premises for insulation of suspicious cases; a look-

THE CURSAAL, OSTEND.

out station, bath and shower-bath accommodations, a laboratory and a dead-house.

With regard to epidemics prevailing in the country itself the government has organized a service of informations.

It has issued « Practical Instructions for the use of the Administrations and the public, in order to prevent the breaking out of contagious diseases and to combat their propagation. »

In pursuance of the Act of December 30th 1882, it has edicted special measures to prevent the outbreak of hydrophobia and hinder its propagation.

Finally it has created, since February 15th 1882, a Central State Vaccinogeneous Office which produces and distributes gratuitly, at all times, the animal antivariolic vaccine matter, to all the communal administrations, to every practitioner and even to private persons.

The Office has produced 1,556,700 doses in pulp during the year 1902. The proportion of successful results, has been of 98.34 %, for the 107,588 vaccinations accounted for, and of 47.41 % for 122,191 revaccinations.

It has instituted a commission directed to control the serums with regard to their action, their preservation, and their delivery, and to establish methods for gauging these commodities. (Royal decree of August 2nd 1901.)

As for food products, the Act of August 4th 1890 has authorised the Government to regulate and to superintend the trade, sale and delivery of the commodities and stuffs used as food for men and for animals, with regard to public health and in order to prevent deceptions and falsifications.

It has also authorized the Government, in the interest of public Health, to watch over the manufacture or preparation of the food products intended for sale, and to prohibit the use of substances, implements or objects either noxious or dangerous.

Availing itself of the powers conferred on it by the Act of August 4th 1890, the Government has issued a series of dispositions regulating the trade of almost every commodity.

A uniform plan has been followed in the redaction of each of these regulations :—

First is given a definition of the pure or normal product : the products, as a rule, can be sold freely without any special label or mention.

Afterwards, the regulations specify the rules to be observed for the sale of products not fulfilling the conditions required in order to be considered as commodities of normal composition. The general principle which pervades the regulations concerning the trade of these products is : that a label should clearly indicate the modification which the composition of the normal product has undergone.

Finally the regulations prohibit to turn into the market commodities either noxious to, or dangerous for public

health, and the use—in preparing those commodities—of stuffs, implements or objects either noxious or dangerous.

Besides, the Government has organised in all the communes of the Kingdom a service for the survey of butcher's meat.

It has also issued regulations on the police of the dangerous, unhealthy or inconvenient establishments.

THE INSTITUTE OF BACTERIOLOGY, UNIVERSITY OF BRUSSELS.

(Royal decrees of January 29th 1863-May 31st 1887-December 27th 1891-December 27th 1886-December 21st 1894.)

It has ordered the redaction of « General instructions » concerning a great number of subjects related to hygiene:—

Instructions concerning the precautions to take, from the point of view of public Hygiene, after floods;—on the drainage of marshes (Act of December 16-26th 1807);—on the conveyance of poisons (Act of December 26th 1876);—on

the construction of dwellings for the working classes (Act of August 9th 1889)—on the transportation of patients and mortal remains by railway;—on the construction of hospitals, alms-houses, and lazarettos;—on hygiene of cemeteries (excavations, disaffectation): decree of Prairial 23rd year XII and Royal Decree of July 30th 1880,—on the construction of dead-houses.

It disposes of credits to allocate subsidies to the communes in order to assist them in the execution of their healthifying works, the establishment of water distributions, construction of sewers, cemeteries, &c., &c., or to pay expenses proceeding from measures taken in order to prevent propagation of epidemics.

The Government has granted its patronage to numerous national and international Congresses which have been held in Belgium, especially to the following :—

The International Congresses of Hygiene which have assembled in Brussels in 1852, 1876, and 1903;

The International Congress of Medical Science of 1875;

The International Pharmaceutical Congresses of 1885 and 1887;

The International Congress of applied Chemistry of 1894;

The International Congresses against the abuse of Spirits of 1880 and 1897;

The International Lectures on the Prophylaxy of venereal disease of 1899 and 1902;

The International Congress of Hygiene and Life-Saving of Ostend 1901;

The International Congress of Alimentation of 1894;

The National Congress of Hygiene and Medical Climatology of 1897;

The National Scientific Congresses of Brussels 1880 and of Antwerp 1885;

The National Congress of Pharmacy of 1895, &c., &c.

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* * *

The provinces may intervene, and the communes as well, in order to prevent calamitous accidents or plagues such as epidemics (Act of August 16th-24th 1790). This intervention is compulsory when authorizations are to be granted for the erection of certain classified establish-

ments (decree of January 29th 1863, &c.). They have to provide the expenses for keeping the hydraulic works in repair, and for improving waste lands (Provincial Act, art. 69, 6°).

The police of the water courses which can neither be navigated nor floated belongs equally to them (Act of May 7th 1877).

Finally, several provinces have organised provincial

THE SENATORIUM OF BORGOMONT.

Institutes of Bacteriology, and disinfection services. These Institutes have assumed the care of analysing the alimentary waters, of investigating the bacilla of tuberculosis, diphtheria, cholera, anthrax, and glanders; some of them perform the chemical analyses of the waters. The provincial services of disinfection repair to the communes, when their presence is requested.

The province of Liege has erected at Borgoumont a sanatorium for consumptive people.

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The mission of the Communes is of the most extensive with regard to hygiene.

The Commune rules whatsoever concerns public salubrity, provided that its decisions be not conflicting with the measures taken by the State and the provinces nor with the special Acts relating to the matter.

It exercises a survey on the genuineness and salubrity of the victuals exhibited for public sale. It is to attend to whatsoever concerns the health of its inhabitants; it has to prevent by suitable precautions calamitous accidents and plagues such as fires and epidemics (Act of August 16th-24th 1790).

It possesses within its attributions: whatever concerns public roads, their cleaning and their salubrity; the police of local security and salubrity (communal law, art. 90, 131); the regulations on cemeteries and on the conveyance of the deceased.

In virtue of these powers, several large towns of the country have instituted bureaus of hygiene. The commune can - in pursuance of royal decrees, issued for every special case, - healthify the insalubrious quarters, by way of expropriation on account of public utility (Acts of July 1st 1858, November 15th 1867 and May 27th 1870).

Finally it organizes, through the medium of the bureaus of Poor Relief the medical and obstetrical service for destituted.

The hospitals and public refuge houses are managed by special commissions created in pursuance of the acts of Vendémiaire 16th year V and of Messidor 16th year VII.

Among the hospitals of the country, those which betoken the best conditions with regard to their construction, are the hospitals of Antwerp, Ghent, Liege, Tournai and Verviers.

The Administration of Hospitals and Succours of the town of Brussels has erected at Linkebeek, a home for convalescents.

INDUSTRIES OF FOOD PRODUCTS

In the returns of the general census of industries and trades of October 1896, the industries having for object to supply the food products necessary to human existence, show a figure of no less than 18,186 establishments, occupying 83,329 persons and disposing of a motive power of 85,000 H. P.

These establishments are distributed between the different industries, in the following way :—

DESIGNATION	NUMBER OF ESTABLISH- MENTS	NUMBER OF PERSONS EMPLOYED
Steam flour-mills	801	4,916
Wind and water-mills	3,163	6,378
Special flour and fecule-works	10	63
Mills for hulling rice	3	123
Starch factories	16	704
Ordinary Bakeries	13,500	21,404
Mechanical Bakeries	74	1,328
Pastry and Confectionery works	716	1,883
Biscuit manufactories	9	71
Manufactories of food pastes	8	121
Malt factories	63	511
Breweries and malt factories	1,489	9,210
Breweries	1,283	4,812
Clarifying and colouring matters for beers and spirits	9	27
Vinegar works	56	186
Industrial distilleries (alcohol and gin)	25	1,093
Rectification of alcohol	5	71
Liquors and spirits	189	915
Beetroot rasping	13	1,824
Sugar Mills	111	20,651
Sugar refineries	13	1,824

DESIGNATION	NUMBER OF ESTABLISH- MENTS	NUMBER OF PERSONS EMPLOYED
Candi-works	22	458
Glucose works	7	176
Preserved food-products	21	409
Margarine.	10	380
Preparations and extracts of meat, smoked fish.	39	220
Chicory	337	1,137
Chocolate	63	1,099
Salt	58	297
Mustard	102	171
Aerated water	246	751
Artificial ice	16	141

Taken altogether, these establishments are quite sufficient to answer the requirements of inland consumption. Some of them, especially the sugar mills, produce principally for exportation.

In the statistics of our special trade for 1902, the products of the food industries, show the figure of 14,770,000 francs under the head : importation, and 37,096,000 francs under the head : exportation. In consequence, an excess of 22,326,000 francs is averred in favour of the products of our national industry.

This favourable situation is owing, not only to the progress realised in the equipment and processes of manufacture, but also to the improvements introduced in the fiscal regulations which govern the principal industries of food products.

Rice Starch.

Starch is made of the amylaceous matter extracted from cereals, especially from wheat, maize and rice. The latter contains up to 37 per cent. of its weight of starch. This high yield, in addition to its exceptional qualities, from the point of view of the starching of linen, account for

the preference which the Belgian manufacture has given to this product.

The superiority of the Belgian products consists in the constancy of its quality. Great endeavours have been made to acquire this result; the rational organisation of labour has progressed at the same rate as the improvement of machinery, which as a rule is very expensive, and

THE CHURCH OF ST.-PETER, LOUVAIN.

which has necessitated long studies and sacrifices of every description. Furthermore, Belgian can boast of possessing at Wygmael, near Louvain, the greatest starch-manufactory in the world.

Our exportation of starch is considerable; it amounted to :—

In 1893	6,507,462 kilos.
” 1894	7,176,652 ”
” 1895	8,131,054 ”
” 1896	8,790,225 ”
” 1897	9,080,993 ”
” 1898	10,639,141 ”
” 1899	12,330,471 ”
” 1900	12,776,667 ”
” 1901	11,663,184 ”
” 1902	12,555,782 ”

Flour Mills.

The wind and water-mills, formerly so numerous in the country, continue to disappear : from 4008, existing in 1883, their number had fallen to 3163 in 1896; whilst during the same period the number of steam-mills had progressed from 683 to 801, doubling at the same time the efficiency of motive power in action, for this power had increased from 9411 to 18,216 H. P.

As for the equipment of flour-mills, it has been averred that millstones are objectionable specially for grinding wheat because they crush the grain too rudely and cause the subsequent separation of the crushed husks, by the bolters, to be very incomplete. Therefore a marked preference over the millstones has been given, to apparatus with fluted cylinders coupled together and moving with differential rotation celerities. These cylinders first of all open the kernel, loosen the husks and the germ, and the multure is completed by repeatedly passing the grist between the cylinders, which increases the yield and the purity of the flour, without producing any over-heating

which may be detrimental to the preserving qualities of the gluten. The process of multure, or formation of plant, which is performed in Hungaria, and is now applied to all our great mills towards 1880 and is now in vogue, if we may say so, has been lately adopted for grinding

or the mill-stones, they are hardly ever found, except in small rural mills, generally moved by water or wind, and they are more specially intended for grinding other cereals, namely barley for forage, which is grown in large quantities in our country.

WIND MILL.

Other improvements have also been introduced especially in the systems of bolting the flour. The hexagonal and centrifugal bolters do not sufficiently utilize the surface of the silk, which under the influence of shocks, allows certain impurities to pass through it, therefore they have been superseded in the large flour-mills, by plane bolters actuated with a reciprocating motion. These bolters known by the name of *Plansichters* act mechanically in the same way as hand-sifters and bolt the grist without great exertion or spilling.

The capacity of daily production of our cylinder flour mills varies from 50 to 1000 and 1500 bags of wheat; it amounts even to 2000 bags a day in our two principal establishments. The total production exceeds 30,000 bags in 24 hours and reaches yearly about 11 millions quintals, valued, despite the fall of the price of wheat, more than 200 millions of francs. The following table gives the figures of the exportation of flour during the year 1902 :—

EXPORTATION OF FLOUR FROM BELGIUM FOR 1902.
(Special trade.)

DESIGNATION	TOTAL (KILOG.)	EXPORT	
		TO HOLLAND (KILOG.)	TO ENGLAND (KILOG.)
Wheat-, spelt- and meslin-meal	28,117,867	22,990,286	3,345,443
Rye-meal	188,784	159,441	—
Barley- and winter barley-meal	424,432	415,752	—
Dat-meal	9,656	4,924	230
Maize flour	3,189,576	291,425	2,885,207
Buckwheat-meal	679	679	—
Others than the above mentioned	2,600,216	1,653,280	225,236
Total	34,531,210	25,515,787	6,456,416

Bakeries.

Since 1889, baking has made enormous progress in Belgium, where wheaten bread is almost exclusively consum-

mated ; it has become a real industry under the impulse of powerful cooperative societies for consummation.

The quality of flour has considerably ameliorated owing to the improvements of the flour mills' equipment. The regulations of the Belgian Custom-house allowing importation of flour duty free, from all parts of the world, the Belgian miller possesses uncomparable facilities to compose his mixture of different kinds of wheat judiciously choosen to obtain flour of great whiteness, of easy rise, of fair returns and of great nutritive power.

The use of compressed artificial yeast has everywhere

ROOD LOFT IN ST.-PETER'S CHURCH, LOUVAIN.

superseded the yeast of beer, which produced bread with less taste, rising not so well and with a less regular mesh.

This use has prevailed especially since the Act of 1896 was passed, which granting more liberty to the distiller, has favoured the establishment of a great number of yeast manufactories. The latter possess a productive power which easily supplies all the wants of the bakeries and renders the importation of foreign yeast very difficult.

Manual kneading is disappearing, superseded by mechanical throughs, brought in action by steam-engines or by gas-motors.

In 1896, the motive power utilised in the then existing

74 mechanical bakeries of the kingdom represented 575 H. P.

The ovens heated by coal, and supplied with mechanical devices for introducing and removing the batch, are superseding the ovens heated by ligneous fuel. They are much less expensive, allow continuous labour and secure without difficulty a regular and precise baking.

The manufacture of fancy-bread, also called Viennese bread, has acquired a great importance in the towns and our bakers produce commodities which can compete with the most perfect foreign products.

Chocolate and Biscuits.

Chocolate was only manufactured in about a dozen factories in Belgium in 1870. The importation was considerable. At present more than 50 manufactories turn out enormous quantities, which not only supply the national market, but allow also of a considerable export trade.

This change is owing for a great part to the survey exercised over this product by the service of hygiene instituted by the government to contrall the food products.

The superior Council of public hygiene had defined chocolate : a mixture of cocoa beans with sugar whether aromatised or not. Only when it fulfils these conditions, can a product be sold under the name of « chocolate. »

The service of hygiene has not only the mission to supervise the exhibition and sale of the various products intended for alimentation, but its mandate extends over the factories, of which it is to contrall the supplies, in the interest of public health, and of the fair reputation of the Belgian industry, generally speaking. The severe control of Government is a great security for foreigners, which are aware that Belgian chocolate cannot be adulterated and that the belgian manufacturers have been compelled to forsake the cheap products in order to look for success in the fineness and good taste of their wares.

The manufacture of table biscuits has also widely extended itself in our country. Formerly we were tributaries of England for products of this description, which are in great demand; nowadays Belgium possesses about ten factories, of which some very important and perfectly

equipped, compete successfully—with regard to quality, refinement of taste and outward appearance,—with the products formerly the most celebrated.

STATISTICS OF THE MANUFACTURE AND TRADE OF COCOA AND CHOCOLATE
IN BELGIUM FOR THE YEAR 1902.

	GENERAL IMPORTATION	INLAND CON- SUMMATION	GENERAL EXPORTATION	EXPORTATION OF BELGIAN COMMODITIES	TRANSIT
Cocoa beans and parings.	4,617,962 kil. worth 6,926,943 fr.	4,052,190 kil. worth 6,078,285 fr.	2,340,329 kil. worth 3,540,493 fr.	1,774,537 kil. worth 2,661,835 fr.	565,772 kil. worth 848,658 fr.
Butter of cocoa.	446,738 kil. worth 4,317,877 fr.	292,401 kil. worth 1,862,583 fr.	240,467 kil. worth 708,315 fr.	85,770 kil. worth 253,024 fr.	154,337 kil. worth 455,294 fr.
Chocolate.	1,049,054 kil. worth 2,360,371 fr.	539,334 kil. worth 1,213,951 fr.	512,003 kil. worth 1,221,532 fr.	33,225 kil. worth 74,892 fr.	509,618 kil. worth 1,146,610 fr.
Prepared cocoa other than choco- late, ground cocoa, cacahout, chocolate tapioca, &c.	530,626 kil. worth 914,095 fr.	57,478 kil. worth 100,062 fr.	467,266 kil. worth 817,745 fr.	3,829 kil. worth 6,701 fr.	463,437 kil. worth 814,014 fr.

Preserved Fish, Vegetables and Fruit.

At the time of the Paris Exposition of 1889, the industry of preserved food products was still in its rudimentary stage in Belgium. While experimenting and trying, the small manufacturers carrying out this industry, did not conceive the possibility of finding a market for these products. Preparing small quantities intended for a limited circle of customers, they were not properly equipped and lacked capable employes to assist them in competing with the foreign products.

Impressed by this state of things, and specially by the

unequal struggle which these manufacturers had to maintain, the Government decreed a custom tax of 15 francs for each 100 kilog. on foreign preserves at their importation in Belgium. Since that time this industry has developed considerably. The markets of the Congo afforded the opportunity for the manufactures to equip themselves and to train a suitable staff in prevision of large and continuous transactions. Very soon did our manufacturers get equal to the circumstances, and powerful manufactories have been erected which enable them to compete, with regard to price, quality, and importance of production, with the foreign establishments which had formerly conquered our market.

The old soldered box has been superseded in our country by the flanged box, which is perfectly sound and can be manufactured by thousands daily, allowing to stow the vegetables in the box when freshly gathered and to preserve its aroma.

The manufacture of jams has also greatly developed owing to the draw-back of accise-duties on sugar granted by the Government in 1897.

This measure has enabled our numerous manufacturers to supply at low rates jams and jellies prepared exclusively with the juice of the fruit and sugar. Consequently the price at which these commodities are sold to the working classes is below the price of butter and even margarine.

As for the manufacture of farinaceous pastes intended for alimentation, it is well represented in our country, its yearly production being valued at about 2,500,000 kilog.; but it is difficult to get precise information on the amount of the importation, for these products are classed under the same head as the similar products.

The manufacture of preserved fish has not yet developed in a similar proportion with the above mentioned preserves. Save a few factories for herring and sprout smoking at Bruges, Nieuport and La Panne, one establishment at Ostend where sprout is prepared as sardines, was all we possessed until recently. Owing to the assistance of the Government, the Reverend Mr. Pype, chaplain of the Belgian navy, and director of the professional school for fishing, has created in Ostend, and annexed to his school, a model establishment for the preparation and preservation of the products of the sea.

Sugar.

Untill the commencement of the xixth century, cane sugar alone supplied the European markets. Imported from foreign countries in the state of raw sugar, it was the originator of the industry of sugar refining in various seaports.

In 1850 our country possessed 45 refineries, to day 28 only are left, but though their number has decreased at such rate, the importance of the production has not followed suit. Indeed the average of the quantities of raw sugar which had been refined from 1841 to 1850 amounted to 22 millions of kilogrammes, when it is not less than 62 millions for the period from 1891 to 1900. It should however be mentioned that these figures do not only refer to raw cane sugar, for since the erection in our country of important manufactories of beet-sugar, a great part of the products turned out by these works has been finished in the refineries.

The extraction of sugar from beetroots has only been carried out on an industrial scale in Europe since about half a century. After the discoveries of the French agronomist Olivier de Serres, and the German chemists Margraef and Achard, this industry was first established in France; afterwards and little by little in Belgium, Germany, Holland and Austria. The first Belgian manufactory was erected at Visé in 1810. In 1843 we numbered 31 of them producing approximately 3 millions of kilogrammes of sugar. During the season of 1902-1903 their number reached 113 and the yearly average of the quantities manufactured during the quinquennial period of 1899 to 1903 has reached 270 millions of kilogrammes.

For a long time cane sugar which was very scarce was considered as an article of luxury, it fetched very high prices and became subject to custom-duties in most of the European States.

These duties which rose gradually, favoured later on the development of the beetroot industry, which was free from every kind of tax and to which the Governments interested did not cease to grant their protection.

The continual improvements introduced in the processes of manufacturing, increased considerably the power

of production and created some fears for the colonies of the European countries, where the culture of the sugar cane constituted almost the sole resource. Beet sugar getting day by day more popular, its consumption increased causing some prejudice to the treasury. Consequently this industry was very soon to get taxed in its turn.

The first duty was established in France in 1835, and since 1836 the different states followed the lead of this country and Belgium, by the Act of April 4th 1843, subjected to a tax the manufacture of beet-sugar. The rate of this duty was fixed at 20 francs for 100 kilogrammes of sugar assessed in the manufactories. This assessment was calculated at the rate of a supposed yield of 1400 grammes of sugar for one hectolitre of juice, at one degree of density, at the temperature of 15° centigr.

In order to compute the quantity of juice obtained the Act stipulated that all juices should pass through clarifying pans gauged by « potting, » not to be filled further than 9/10 of their total capacity.

The duty of 20 francs became in succession 30, 34, 40, 37, 38, 39, 42 francs and finally 45 francs from June 1st, 1861.

As for the rate of the assessment, it rose to 1475 grammes in 1865, to 1500 in 1866, to 1650 in 1889, to 1700 in 1890, to 1750 in 1895 and finally to 2000 grammes in 1899.

The Codification Act of April 16th, 1887 cancelled all preceeding acts on sugar. By its 31st article, it prescribed the establishment in each factory of at least two measuring vessels conform to the model adopted by the Administration and intended to ascertain the capacity of the juice used for the taking in charge.

The accise duty was maintained at 45 francs for 100 kilog. of raw sugar.

In order to be able to sustain the competition with cane sugar, the sugar industry had to be protected by the various governments. They first levied custom duties on foreign sugar, which were often modified, but always in the sense of protection. They next subjected this sugar to surplus taxes in order to preserve the national market for the products of national manufacture. On the other hand they granted bounties to exportation and other indirect advantages, especially those resulting from exce-

THE GUILD HOUSES ON THE W. SIDE OF THE « GRAND'PLACE », BRUSSELS.

dents or bonuses of manufacture, obtained beyond the legal presumption of the returns of beet juice in sugar.

But this system of bounties which maintained artificially the factories and refineries of beetroot sugar, was not long before it created a very difficult situation. It prejudiced the finances of the country which granted them, placed on the national consumption a burden out of proportion with the income which the Treasury really perceived, hindered the normal competition on outside markets, and finally raised the sale price of the sugar delivered for inland consummation.

In order to improve this situation where numerous interests were conflicting, several international conferences took place, at Paris in 1863 and 1864, at the Hague in 1868 and 1869, at Paris in 1873, at Brussels in 1875, at Paris in 1876, and at London in 1887.

The results of these conferences were not satisfactory. They did not suppress the system of bounties and super-taxes which quite contrariwise rather developed.

The English colonies producing cane sugar, which had already recriminated against this situation, uttered again their ardent protests. On the other hand, the United States of America and the Indian Government had decided to strike the bounty-sugar with compensating taxes. They had needs to come to an agreement. The Belgian Government took the initiative. It caused a new conference to assemble, in Brussels, on June 7th 1898, where the presence of the delegates of Germany, Austria-Hungary, Spain, France, Great-Britain, the Netherlands, Russia and Sweden, was secured.

No agreement was entered upon by the delegates of these different nations and the Conference had to be adjourned. But they directed Belgium to continue the negotiations by diplomatic way in order to arrive at a conclusion satisfactory for all parties.

In consequence of these negotiations, a new session of the Conference opened in Brussels in December 1901, and it concluded the Convention of March 5th 1902, which binds all the countries of central Europe, where the production and exportation of the beetroot sugar are the most intense. The adherence of Russia, however, could not be obtained, but in compensation that of Italy was granted.

This international Act is of the highest economical

importance. Among its principal clauses, it stipulates the general engagement to suppress all direct or indirect bounties, which favoured production or exportation of sugar. This Convention has not only reintegrated the production and trade of sugar in their normal economical conditions, but it has bestowed a considerable benefit on agriculture by securing the stability of beetroot culture. It has also caused the lowering of the accise-duty, whereof the result will be to favour the consummation of sugar and of the commodities in which it enters, such in chocolate, biscuits, jams, &c.

PLACE DE BROUCKÈRE AND INNER BOULEVARDS, BRUSSELS.

According to Article II. of the Convention, the contracting parties take the engagement of submitting to the system of bonded warehouses under the permanent supervision, by day and by night, of the fiscal officers, the manufactories and refineries of sugar, and also the works where sugar is extracted from molasses.

In order to comply with this obligation, the Belgian Government has, by the Act of August 21st 1903, substituted the tax on the real returns to the tax on the capacity, and fixed the duty at 20 francs per 100 kilog. for sugar of every description manufactured in the country and intended for inland consummation.

Independently of the exoneration of the accise duty for

the sugar either exported or used for manufacturing vegetable preserves, jams, jellies or syrups of fruits, condensed milk and milk-flour, the above mentioned Act autorises also the exoneration, on condition of previous denaturation, of native sugar or refinery syrups intended for industrial uses or for feeding the cattle.

Statistics of importation, manufacture and exportation of sugar show the following figures :—

	DECENNAL AVERAGES.		1902
	1881-1890	1891-1900	
<i>Importation.</i>	K.	K.	K.
Raw sugar (special trade)	15,405,115	11,109,462	12,362,000
Refined sugar (special trade)	3,116,376	588,607	568,345
<i>Native manufacture.</i>			
Number of manufactories.	130	122	113
Quantities of raw sugar entered in the accounts of manufacture	100,034,722	202,146,863	185,069,797
Quantities of raw sugar exported or deposited in public bonded warehouses, with exoneration of accise-duty . .	88,343,851	150,809,910	125,463,392
<i>Native Refinery.</i>			
Number of refineries . .	34	29	28
Quantities of raw sugar taken to the refineries.	27,095,986	62,446,425	71,968,405
Quantities of refined sugar or syrup produced.	26,283,106	60,573,032	69,809,353
Quantities of refined sugar exported	14,448,916	42,698,291	34,427,089

Distillery.

The Distillery that, at the beginning, worked exclusively with corn and employed rudimental implements was an essentially agricultural industry.

The great industrial Distillery dates only from the beginning of the xixth century, when, about 1820, Cellier Blumenthal invented continuous distillation.

It is about the period of distilling columns invention that Belgium began to take a serious interest in the manufacture of alcohols. As well as in other countries, the public Treasury has taken advantage of the consumption of those products. The taxes have been very variable.

At the beginning the tax was collected according to the capacity of the tubs used in the maceration and fermentation of raw materials, and the distilleries have been generally divided into two categories : industrial and agricultural distilleries. The latter were allowed a reduction of duty, so much the more efficacious that the rate of this duty did not cease increasing.

In 1833, the reduction, which was 20 per cent., was suppressed.

The duty for manufacturing was, at that epoch, 22 centimes per hectolitre of capacity of tubs. This duty was successively raised to 40, to 60 centimes, then to 1 franc, fr. 1.50, fr. 2.42, fr. 4.55 and so on, up to 14 francs.

In 1837 the reduction in favour of the agricultural distilleries was reestablished, at the rate of 10 per cent. first, and 15 per cent. from 1841.

In collecting the tax according to the capacity of the tubs, all the profit of industrial progress is left to distillers. In other terms : the real yield in alcohol exceeded the legal yield, that is to say, the yield in alcohol that a hectolitre was supposed to produce; the surplus of manufacture thus obtained constituted a real profit for the distiller because of the exemption of duties. This surplus increased regularly in proportion to the improvements made in the system of work.

With a view to obviate that situation the raw materials were first divided into classes according to their richness with regard to distillery. There were six classes, the first subdivided into four categories. Besides, a distinction was made between distilleries working without the use of a special apparatus for the maceration of raw materials and those working with such an implement.

Afterwards, the Government watched carefully over the yield really obtained in distilleries, in order to be able to fix yearly the duty for each category of raw materials

according to the average yield ascertained by the agents of the administration. The share of the excise was calculated by applying to the legal yield the rate of discharge at the exportation duty which, before 1896, was 64 francs per hectolitre of brandy at 50 degrees.

The rate of duty resulting from this operation was the basis of the collection of the tax during the following year.

The law of 1896, modified by that of the 28th of July 1902, entirely transformed the fiscal system applied to distillation. The excise duty is no longer based on the capacity of the tubs; it is calculated by the phlegms or alcohols really produced. It has been raised successively from 64 francs to 100 and 150 francs per hectolitre at 50° of Gay-Lussac's alcohometer, at the temperature of 15° centigrade.

Notwithstanding the collection of the duty on the real yield, the legislation has maintained a moderation of duty in favour of the agricultural distillers who cultivate a certain extent of lands and who feed, in the enclosure of their establishment, a certain number of cattle.

This moderation is now 8 centimes for those of these distillers who do not manufacture daily more than 4 hectolitres of phlegen; it is 10 centimes if the total production of the manufactory does not exceed 600 hectolitres from the 1st of January to the 31st of December of one year.

Since the reform of 1896, our distillers may gather the leaven and manufacture the yeast for sale. Before that epoch the Belgian legislation prohibited the production of yeast in distilleries. Our industrials were tributaries from abroad for this substance, which is, however, indispensable for the manufacture of alcohol, and they expended yearly millions of francs in order to import this substance.

So, in 1895, Belgium received from foreign countries for 9,535,092 francs of leaven destined for distillery and of yeast destined for bakery. Holland supplied us with 4,832,383 francs of those products, France with 2 million 898,062 francs, and England with 1,562,205 francs.

In 1898, these importations were reduced to 1,294,402 fr. of which 953,760 francs represented by importations from the Netherlands and 334,235 by those of France; in 1902, the amount of those importations was only 635,505 francs of which 560,259 fr. for the Netherlands and 66,079 fr. for France.

In 1832, Belgium produced 166,742 hectolitres of alcohol at 50°; the capacity liable to duties were then 3,031,581 hectolitres, whereas in 1895, on the eve of the new legislation, 4,024,893 hectolitres of materials liable to duties produced an official yield of 628,431 hectolitres, at 50°, that is, in counting the surplus of manufacture exempt of duty, a real yield of almost 680,000 hectolitres.

In 1896, only 546,471 hectolitres of alcohol at 50° were produced; in 1897, we reached 592,645 hectolitres; in

OLD MUNICIPAL RECORD OFFICE AND TOWN-HALL, BRUGES.

1898, 593,341 hectolitres; in 1899, 678,456 hectolitres; in 1900, 716,951 hectolitres, and in 1901, 736,905 hectolitres. But in 1902, because of the increase of excise duty from 100 to 150 francs per hectolitre, the production fell to 657,165 hectolitres.

The law of 1896 allowed the exemption from excise, for spirits destined to industrial uses. The quantities which made a profit of this measure are in the years 1896, 1897, 1898, 1899, 1900, 1901 and 1902 respectively 4811 hect.,

10,800 hect., 11,032 hect., 10,895 hect., 15,046 hect., 21,367 hect. and 35,128 hect.

The following table gives, for the years 1901 to 1903, the importance of production and consumption of alcohol in Belgium; owing to the progressive augmentation of the alcohol taxation, the consumption has been always decreasing since many years :—

	1901 — H. AT 50°	1902 — H. AT 50°	1903 — H. AT 50°
Manufactured { Quantities liable in the country. { to tax	736,905	657,165	492,213
Importations	17,837	11,850	10,471
Totals. . .	754,742	669,015	502,684
Exportation exempt of duties . .	58,349	52,287	67,413
Leaves for consumption	696,393	616,728	435,271
Quantities employed to industrial uses	26,368	40,129	65,172
Human consumption	670,025	576,599	370,099
Population.	6,759,690	6,826,219	6,893,403
Consumption per head	91.91	81.45	51.37

Malt Manufacture.

Till 1870 the brewers used to manufacture their malt themselves, but since, the considerable increase in the consumption of beer, and the erection of ever-increasing factories have given to the malts production a rapid and considerable growth. There is no province, no large town which does not possess one or several malt manufactures in activity. Some of them being equipped for a production of more than 5 millions of kilog. yearly.

There is no country in the world where are sold so many different types of beer of high, low, mixed and spontaneous fermentation as in Belgium.

The belgian malt-manufactures which have followed and applied every kind of improvement are at present

fitted up according to the latest and most perfect discoveries. They produce all descriptions of malt which are needed for the various beers of special taste, colour and kind.

Our principal manufacturers have participated with advantage to all great International Exhibitions which have taken place in Europe since 1885.

Brewery.

This industry holds one of the most important places among the national industries of Belgium.

The production of beer in 1902 exceeds 14 millions of hectolitres, which is about $\frac{1}{3}$ more

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THE CATHEDRAL OF SAINT-ROMBOLD, MECHLIN.

wery which was applied in 1886. It consecrates a greater liberty of work, while securing at the same time the interests of the Treasury. It has also allowed the introduction of considerable improvements in the equipment and in the system of manufacture.

The exportation of beer has gradually developed creating new markets and opening new roads to the activity of Belgian breweries.

The table which follows indicates first the progression of this industry since the application of the new law

perceiving the duty according to the quantity of flour declared; and next the decrease of the number of brewers working still according to the superannuated system of the act of 1822.

YEARS	NEW LAW		SYSTEM OF 1822		TOTAL	APPROXIMATIVE
	NUMBER	QUANTITIES	NUMBER	DECLARED	NUMBER	QUANTITIES
	OF BREWERIES	OF TAXABLE FLOUR	OF BREWERIES	TAXABLE CAPACITIES	OF BREWERIES	OF BEER PRODUCED
		Kilog.		Hectol.		Hectol.
1886	1,938	108,458,845	697	703,792	2,635	9,460,801
1890	2,433	141,315,072	373	243,842	2,806	10,770,658
1895	2,724	161,638,135	190	116,992	2,914	12,230,308
1900	3,112	192,492,081	111	67,876	3,223	14,616,535
1901	3,153	191,083,306	100	59,332	3,253	14,660,330
1902	3,200	188,347,995	76	37,449	3,276	14,431,418

Formerly there were only two systems of manufacture employed in Belgium; viz. :—

1° High fermentation beer, which is the most demanded;

2° Spontaneous fermentation beers, which are special beers made in Brussels and in the neighbourhood.

Since then large and extensive works have been erected to manufacture, low fermentation beer of the austrian and german type of which successfully compete with the foreign products.

Strong ales of the english type—ale and stout—are also manufactured and highly appreciated.

The General Association of Brewers, having its seat in Brussels, constitutes the Federation of all Brewers' Societies of Belgium.

These Societies assemble in periodical meetings where they ventilate the means of improving the material situation of the brewers, and they organize lectures on scientific subjects likely to introduce improvements in their manufacture.

Every year in July, in the chief-town of each province in rotation, take place the great brewers' assizes organized under the guidance of the General Association.

Belgium possesses several establishments of brewery

education which are in great repute and have a great number of native and foreign pupils :—

The Superior Institute of Brewery of Ghent;
The Superior School of Brewery connected with the University of Louvain;

THE BREWERS' GUILD HOUSE ON THE S. SIDE OF THE « GRAND'PLACE » BRUSSELS.

The Technical Brewery School annexed to the Institute of St. Lievin at Ghent;

The Brewery School annexed to the College of La Louvière.

Different newspapers on brewery are published in

Belgium; the most important are : the *Little Journal of the Brewer* and the *Adviser of the Brewery*. These publications appear periodically and are redacted with great authority. They constitute for the brewers, detained by their work far from the brewery schools, a serious and invaluable teaching.

Wine.

The consommation of wine has a tendency towards generalization in Belgium; in this respect statistics show a steady progression.

The table of importations during the latter years shows the following figures :—

In 1898 . . .	266,686 hectolitres.
» 1899 . . .	281,575 »
» 1900 . . .	311,091 »
» 1901 . . .	315,750 »
» 1902 . . .	315,859 »

The Government has endeavoured to favour by fiscal measures, the vulgarisation in the country of wine which is not over alcoholised. With this view the excise duty which formerly amounted to 23 francs per hectolitre, has been reduced by 20 francs per hectolitre, for wine in casks (*). With the same view the duties on bottled wines (which amounted to 60 francs per hectolitre) have been reduced to 20 francs per hectolitre, when sterilised non fermented wine is concerned (pure juice of wine) containing no alcohol, and bottled; always, provide the importer forward for every case a certificate from the manufacturer, certifying the liquid is free from alcohol.

Wines containing 24 per cent. of alcohol or more are assimilated to spirits, that is to say they pay a tax of 350 francs per hectolitre.

Wines imported otherwise than in bottles and of which the standard is higher than 15° (alcoholometre of Gay-Lussac) at the temperature of 15° centigr. are liable in addition to the tax of 20 francs per hectolitre, to a duty of

(*) Wines imported in demi-johns, pitchers, &c., and other recipients of this description of which the capacity is larger than 10 litres, are subject to the same tax as wines imported in casks.

fr. 3.50 by degree, on the quantity of alcohol exceeding 15 degrees.

Are liable to a tax of 60 francs per hectolitre, whatsoever their recipient may be, the wines prepared with aromatic plants, cinchona or other medicinal substances,

THE « MAISON DU ROI » ON THE N. SIDE OF THE « GRAND'PLACE », BRUSSELS.

and those also which have undergone a preparation in order to be made into sparkling wines.

Finally, remission of the accise tax is granted, on the quantities of dregs which the wines contains, provide

these quantities do not exceed 10 litres per hectolitre.

Are equally exempted as « trifles » samples of wine imported in bottles of which the capacity does not exceed 15 centilitres, provide the custom authorities do not suspect they be intended for any other use than degustation.

In Belgium, wines are granted admission to public and private bonded warehouses, where they can be mixed, diluted, decanted, drawn off, &c.

Wholesale wine merchants can obtain, by depositing a sufficient security, nine months credit for the payment of accise duties on imported wines, when consigned, for quantities of at least 4 hectolitres. This credit is reduced to three months, for wines coming from a public or private bonded warehouse.

The term of credit starts from the last day of the month during which the declarations were made.

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We have still to mention the wines which are manufactured in the country.

Sparkling wines are subject to a special tax of 40 francs per hectolitre.

As for wines manufactured with dry fruit, their tax, fixed at 23 francs for every 100 kilog. of dry fruit used, must not be less than fr. 4.60 per hectolitre of the gross capacity of the vats used for the dilution and maceration; it is also exigible for each partial or total renewal of the materials.

The favour of credit is also granted to manufacturees of wine with dry fruit. The assessment is established at the end of each month according to the declarations of the work which has been completed in the course of this month : the duties determined in this way being payable by three instalments being respectively of three, six or nine months.

Coffee.

In all parts of the country, coffee is above every other the popular beverage.

In order to ascertain this preference, it is sufficient to

THE DOCKS, ANTWERP.

consider the large quantity of coffee imported every year for consumption : —

In 1898 . . .	30,894,993	kilog.
» 1899 . . .	32,802,585	»
» 1900 . . .	26,322,534	»
» 1901 . . .	32,645,718	»
» 1902 . . .	31,597,678	»

A commodity which plays such important part in public alimentation, must needs occupy the attention of legislation. In addition to certain measures taken in the country itself, in order to hinder adulteration and to secure in this way the traffic of a sound and nourishing commodity, the Belgian Houses, on request of the Government, have passed the Act of February 18th 1903 which allows free importation of unroasted coffee, and maintains a custom duty reduced to 10 francs for 100 kilog., on roasted coffee.

In the main, the principle on which the general Direction of customs and excises is acting, tends to cheapen the cost of life. The raw material required for the alimentation of the people are imported and prepared, either duty-free or with very moderate taxes. These regulations are essentially favourable to general well-being and allows the indirect reduction of the cost price of national labour.

Mereover a similar aim guides the above-mentioned Direction with regard to industry, generally speaking. There are, little, or no custom duties, on raw material necessary to industry, and very trifling duties on the products which Belgium does not manufacture itself, or for which it is not so well equipped as its neighbours.

The whole of these dispositions creates, in consequence, a favourable situation, for industry and for the customer as well.

What has been mentioned in one of the foregoing chapters, concerning agricultural products and the price of cereals, will confirm this opinion.

Furthermore, the Act of July 18th 1860 has abolished the town-dues (*octrois*), this kind of inland Custom House, which, in several countries of Europe, continues still to raise artificially the cost of commodities of first necessity.

We borrow the following data, from the valuable publication of the United States of America's *Department*

of *Labor* entitled « Cost of production. » Calculating, in 1890-1891, the expense involved by the purchase of food, for thousands of workingmen, budgets collected by the special agents, the *Department of Labor* reduces all these budgets to a common measure and establishes the annual expense of one adult labourer in the different countries, as follows :—

Belgium.	fr. 222.42
Germany	238.59
France	323.44
England.	340.27
United States of America. .	346.33

Belgium of which such masters as Teniers and Jordaens, have symbolised the ardent « joy of living » cannot at present, any more than formerly, pass for a land of anchorites or abstainers. In consequence, the figures issued by the *Department of Labor*, though they are ancient, preserve their whole signification, from the point of view of the cost of life : food is cheaper in Belgium than anywhere else; the expense which burdens the laboured in this respect is less than in the principal industrial countries of Europe, and in the United States.

We shall have the opportunity of pointing out, when treating of Social Economy, the reductions of taxes granted for the purchase of small properties and the favours granted for the construction of cheap dwellings. We shall also mention the liberal subsidies bestowed on mutualities and shall show once more the tendency of the belgian State towards the gradual decreasing of taxes for the labourers and diminishing the burden of the small tax payer.

A relatively considerable number of workmen which are occupied in towns or in great industrial centres live in the country. Season tickets at very low cost, and special trains have been granted to them by the Railway Administration, and even by the tramway Societies. These workmen are thus enabled better to cumulate their industrial labour or their trade with a small intensive culture.

The labourer's family finds there a supplement of income whilst deriving the benefit of the country's open air.

SOCIAL ECONOMY.

History of the Organization of the Labour Office.

The central commission of statistics of Belgium, created by royal decree of March 16th 1841, has been for many years directed to investigate the economical conditions of industry and industrial labourers. Under the management of Quetelet, the celebrated founder of social statistics, and with the cooperation of distinguished men, such as Heuschling, Ducpetiaux and Visschers, this commission published some works which became renowned and on the best grounds. Among these may be mentioned the three-fold census of 1846, bearing on population, industry and agriculture, and the studies which were published in the *Bulletin of the Central Commission of Statistics*.

Still,—owing to the ever-increasing complexity of economical relations,—the extent of the deficiencies which impaired the informations collected according to methods no longer adequate to modern requirements, became very soon manifest. In 1886, in consequence of the strikes which broke out during spring, the Government determined to collect exact informations on the economic conditions of the belgian working classes, and intrusted a Royal Commission of Labour with the care of conducting a thorough investigation on the questions pertaining to labour and the condition of the labouring classes. But the Royal Commission did not confine itself to this mission : it discussed and drew up several preliminary schemes of Acts calculated to redress the ascertained grievances and to introduce the improvements which it deemed necessary. The deliberations of the Commission of Labour became the substantial foundation on which the belgian legislation on labour has rapidly been raised.

The investigation of 1886 had collected the most invalu-

able materials. With a view of securing the continuity of this work, the Government decreed that the Councils of Industry and Labour, and the Inspectors of Labour should act as agents for collecting information with regard to the conditions of labour, and that such information should be published by the Direction of Industry, for the questions of social economy were at that time incumbent to the latter.

In the meantime, on April 7th 1892, the Government created the *Superior Council of Labour*; this assembly which mustered economists, manufacturers and workmen, undertook—on the request of the Minister of Agriculture, Industry and Public Works,—a comparative study on the organization of the statistics of labour in the different States, and drew up conclusions which settled the mission of the Administration entrusted with the care of elaborating these statistics.

Since November 12th 1894, this mission had been bestowed, by royal decree, on a new administration : *the Office of Labour* connected with the Department of Agriculture which was to be called henceforth : Department of Agriculture, Industry and Public Works. The statistical investigations concerning labour, the study of new legislative measures, the care of watching over the execution of the labour laws, such was the field of activity attributed to the Office of Labour.

The definitive organization of the Office of Labour was settled by the royal decree of April 12th 1895, which reproduced the essential conclusions voted by the superior Council of Labour. This decree is still in force at present.

But the Government became very soon aware of the necessity of dividing between two ministerial Departments the numerous and important administrative services which composed the Department of Agriculture, Industry, Labour and Public works. The new Office of Labour, the Administration of Mines, and that of Industry, formed henceforth *the Department of Industry and Labour*, instituted by the royal decree of May 28th 1895.

The organisation of the Office of Labour makes this Administration distinct from the Statistical Offices such as the United State have fostered from their birth, and as several European nations have imitated since. These offices have no other object but to collect and work up the official statistics. The Office of Labour has a much

larger sphere of activity. Its first duty is to investigate the situation of industrial and agricultural labour, and the condition of the working classes in industry, crafts, trade, agriculture and conveyance. But it cooperates also to the study of new legislative measures; it secures the administrative execution of the laws on labour and social providence, and finally performs the inspection of Labour which has been entrusted to this Administration. The Office comprises at present six administrative sections and about fifty officials of every grade. It disposes of extensive credits for its studies and for the execution of the laws which belong to its province.

Superior Council of Labour.

Instituted by royal decree of April 7th 1892, the superior Council of Labour has rapidly succeeded in acquiring a real prestige, through the impartiality and the concern for genuine information which have always characterized its numerous debates. The superior Council of Labour, —according to the decree we have just mentioned, and which rules its attributions — emits its opinion on the questions which the Government chooses to lay before it, and draws up the schemes which the latter may think fit to request from it. It is composed of 48 members; 16 of these are employers and 16 are workingmen, and the remaining 16 are selected among persons specially conversant with economical and social questions. The members of the Council are appointed by the King, who has on several occasions granted the renewing of the mandate intrusted to them in 1892.

The share of the Superior Council in the elaboration of legislation on labour and the execution of the measures required by the latter has been considerable. From 1892 the Council was preparing preliminary schemes of royal decrees concerning the duration of labour, the duration and conditions of the intervals allowed for rest, the exceptions to be granted in the case of night-labour and for a seventh day weekly, for the awarding of such decrees was called forth by and in application of the Act of December 13th 1889 on the employment of women, young persons and children in factories and workshops.

From 1893 to 1895 the Council was engaged in a long and thorough debate on the minimum of wages; it studied especially the question of the duration of labour in the brick-fields, and drew up its conclusions with regard to the organisation of the Statistics of Labour. As everybody knows, the scheme of the Council has been almost

M. FRANCOTTE.

Minister of Industrie and Labour.

entirely taken up by the organic decree of the Labour Office.

The most summary analysis of all the debates which have occupied since the Superior Council of labour would require too great space; the most important are those on the contract of labour, the regulations of the workshops, the workmen's compensation for accidental injuries, the councils of industry and labour, the weekly rest, the measures concerning health and safety in industrial premises,

Councils of Industry and Labour.

The councils of Industry and labour, of which the institution dates as far back as August 16th 1887, have for their object : to deliberate on interests common both to employers of labour and to labourers and to foresee and eventually to clear up the disagreements which may arise between them. Every council is created by royal decree, determining the extent of its jurisdiction and dividing it in as many sections as the circumscription possesses distinct industries, combining the necessary elements to be usefully represented.

Each section is composed, in equal number, of employers and labourers elected by their peers for a term of three years. The number of the members may not be inferior to six nor exceed twelve.

When a strike breaks out or threatens to do so, the competent section is convoked by the Governor of the Province, the Burgomaster or the President, on request of one of, either the employers or the labourers.

The King may assemble the Councils of Industry and labour, to express their opinion on question or schemes of general interest pertaining to industry or labour.

Actually, there are 76 Councils of Industry and Labour including 163 sections.

Councils of experts (prud'hommes).

The Councils of experts of which the actual organization is regulated by the Act of July 31st 1889, constitute a special jurisdiction of which the task is to settle through conciliation or by judging the disputes arising between masters and workmen, or even between workmen, for any matter of work, labour and wages.

Every one of these councils is established by an Act which determines the seat of its jurisdiction. They are composed of six members at least, half of them employers, half labourers, elected respectively by their peers for a term of three years.

The President and vice-president of each council are appointed by the King, the candidates being nominated by the members, both employers and labourers. But both may not be chosen among the candidates of the same

group. In case of parity of votes, the president has the casting-vote.

Each council forms in its own body, a bureau, of which the office is to conciliate the parties. This bureau composed of one member employer and one member labourer is renewed every quarter. No case is submitted to the council which has not first been laid before the bureau of conciliation.

The councils of experts take cognizance of applications within their competency up to 200 francs without appeal, and, under appeal, to any amount whatever.

There are 33 councils of experts in the Kingdom. In 1902, 8462 affairs have been laid before these councils. Out of these, 5320 have been settled by means of conciliation.

Statistics of Labour.

When the Office of Labour was created, the need of exact and certain data concerning the situation of industry was made manifest in the most imperious manner.

And, in fact, without such data it was impossible to edify a good legislation on industry and labour. Only one general census of industries and trades had been collected in Belgium, half a century ago, on October 15th, 1846. In 1866 the operation was performed again, but with such unsatisfactory results that it was deemed preferable not to publish the returns. In 1880 an industrial census took place concurrently with the census of population and agriculture; but it concerned only certain industries and did not involve half the labouring population. The returns were published in 1887. At the time of the decennial census of the population in 1890, the operation was not renewed.

One of the first tasks which the Statistical Section assumed was to lay, on a really scientific basis, the foundations for statistics concerning the industrial establishments and the working classes employed in them.

A general new census of industries and trades, took place on October 31st, 1896, without coincidence with a census of the population. It is essentially composed of two parts : the census of industrial establishments and the census of industrial labourers. In this way the census

comprised every person in Belgium engaged in industrial pursuits either as principal, foreman, director, manager, clerk, &c., or as labourer working in a shop or at home.

The returns of the census were published from 1898 to 1903 in 18 vol. in 4° with a statistical atlas.

The industrial establishments belonging to private parties are in number of 330,000, that is to say there are in Belgium 330,000 factories, mines, quarries yards, shops, (small and great) where some kind of industrial labour is carried on.

The organization of the production is not the same in the 330,000 undertakings of private industry.

We are to distinguish :—

Centralised production, which constitutes industry properly so called, where the employer or occupier of the premises works either by himself or with labourers on the very spot of the undertaking. The census returns 236,000 of such undertakings.

Decentralised production where the employer causes goods to be manufactured outside of the seat of his undertaking, by workmen disseminated and working at home. Such undertakings numbered 94,000.

All together 1,130,000 persons (860,000 men and 270,000 women) are occupied by private industry, either as principals or as clerks or as workmen.

This number represents more than a quarter (29 per cent) of the entire population above the age of twelve years. Out of these 1,130,000 persons, 247,000 independent principals working on their own account (175,000 men and 72,000 women).

The proportion between principals and the total amount of the population occupied is 21 per cent., that is out of 100 persons exercising a trade or industry, 21 are independent.

There are 41,000 directors managers, civil engineers, foremen, supervisors, employés (38,500 men, 2,500 women).

« Few are the countries where the labourer's activity is applied to as various and as many branches. There is hardly any important industry which is not carried on in Belgium. » Thus wrote Quetelet and Heuschling in their introduction to the industrial census of 1846. And such is still the general impression left by the census of 1896. It is sufficient to point out that, with regard to classification, 667 industries and trades have been returned while

in 1846 they numbered only 331. Without drawing thence the conclusion that 336 new industries have been introduced in our country during this half century, it may nevertheless be inferred from these figures that belgian production has become considerably diversified. But progress has not stopped there, the increase of the importance of industry has not been less as we shall see by and by when comparing the returns of 1846 with those of 1896.

The importance of the various industrial branches can be valued by :—

(a) The number of persons occupied (employers, clerks, workmen);

(b) The number of workmen occupied in mines, quarries and factories, or at home;

(c) The motive horse-power.

The following table shows which are, from this three-fold point of view, the most important groups of industries of the kingdom.

INDUSTRIES	TOTAL NUMBER OF PERSONS OCCUPIED (PRINCIPALS, EMPLOYERS, LABOURERS)	TOTAL NUMBER OF LABOURERS WORKING		TOTAL NUMBER OF H. P. FOR STEAM, GAZ AND PARAFFINE MOTORS
		IN SHOPS (not at home)	AT HOME	
Mines	128,313	121,993	—	131,415
Quarries	38,969	35,102	530	20,302
Iron works . . .	134,333	98,955	7,675	75,600
Ceramic	7,744	7,083	11	3,111
Glass making . .	22,797	21,699	—	12,781
Chemical works.	20,715	17,622	48	15,279
Food products. .	90,443	57,359	2	64,590
Textiles	169,778	81,103	76,757	67,481
Clothing	137,966	37,210	13,657	848
Building trades .	93,577	62,607	—	5,775
Wood and furni- ture	88,457	39,726	2,304	7,428
Hides and leather	57,702	17,590	12,410	3,087
Tobacco	12,034	9,731	445	478
Paper	9,448	8,370	165	10,759
Printing	14,049	10,706	—	1,336
Art and precision	9,611	6,502	207	1,233
Miscellaneous industries.	24,435	13,658	4,409	8,642
Transportation , except State Railways . . .	41,873	16,959	—	195,410
	1,102,244	663,975	118,620	628,255

The groups of textile, clothing, metallurgic and mining industries occupy each of them more than 100,000 persons. If we consider only the labourers of industry properly so called, the mining industries are on the first rank with 122,000 labourers, and next the metallurgic industries with 99,000 labourers the textile industries with 81,000, the Building trades with 62,000 labourers. As for the power in H. P. the transportation industries (conceded railroads, tramways, steamboats) are first with 195,000 H. P., and next the mines with 134,000, the metallurgic industries with 75,000, the textile industries with 67,000, the food industries with 64,590.

The analysis,—even summary—of the various data of the census, of which the combinations have been published in more than twenty statistical tables, would far exceed the limits of this study. All these returns have been the object of very thorough studies : geographical distribution of the undertakings, distribution according to the mode of working (undertakings with or without workmen, managed by private persons or by public companies either joint-stock or cooperative), distribution according to the number of labourers occupied at the seat of the undertaking, according to the date of foundation, according to the sex and age of the labourers, according to the time of labour (night labour, day labour, alternating labour), according to the duration of labour, the rate of wages, the mode of calculating wages and according to the use of motive power.

The statistics of wages has been the object of special care : the wages of all important establishments have been established in the course of a special investigation which lasted four years. The returns are published in seven volumes (vol. IX. to XV. of census). The statistics of wages are characterized by this peculiarity that the rates of wages have been established by the pay rolls of the manufacturers and from the last pay which preceded the census. They do not represent an average, but the real income of a normal day of labour for each labourer male and female at the end of October 1896. The returns have been published by undertaking and professional speciality for 613,000 labourers (513,000 male and 100,000 female).

The information collected by means of tickets of labourers' families have also been studied in a series of

statistical tables : they have specially been directed towards data which the census of the establishments could not supply; combinations of age, sex, civil state with profession, distribution of the labouring population by communes, distribution according to the birth places, to the labour places, finally the composition of the labouring families with regard to the profession and the contribution to household expenses.

As we have seen already before, the industrial census of 1896 has almost coincided with the fiftieth anniversary of the only complete census which had been carried on previously in Belgium, October 15th 1846 to October 31st 1896. The comparison of the data returned at half a century's interval cannot fail to be full of interest.

In this respect the census of 1846 possesses serious guarantees of genuineness as much on account of the methods followed as of the care bestowed on the criticism of the returns.

There were in 1846, 160,000 undertakings of industries and trades, that is 160,000 factories, mines, yards, where a principal was working on his own account whether by himself, or with workmen.

This number has increased by half in fifty years : 300,000 in 1896.

In the meantime the number of labourers employed in these works has risen from 300,000 to 700,000, that is more than duplicated.

In 1846 there were about 2 (exactly 1.8) shop-labourers for each principal ; in 1896 they are 3 to 1.

This increase in the average number of workmen for each establishment supplies a token of the progress of the great industry.

The total number of persons employed in any quality whatever in industry and trade was 660,000 in 1846. Fifty years after this number is increased by two thirds and reaches 1,100,000. Still the total increase of population is only of one half from 4,337,000 to 6,496,000 : which signifies that there is a greater development of the classes of population carrying out industrial pursuits.

But what most essentially characterizes the industrial development of the country during this half century is the motive power employed. If even we substract the industry of transportation, the number of H. P. has

become more than tenfold, rising from 40,000 to 430,000.

The following estimation will give an idea of the increase of productivity represented by these figures. It is commonly admitted that 1 H. P. is equivalent to 10 men; it follows that the whole productive power of industry in 1846 represented 1,060,000 labourers. Now this number is just equal to the actual whole industrial population (1,100,000). It follows that the actual H. P. represents the nett increase of productive power; this power being 430,000 H.P., that means, if we did not use motive power—and make due reservations on the empirical significance of this result—4,300,000 more labourers would be necessary in order to reach the present production.

Concurrently with the industrial census, the Statistical Bureau had undertaken an investigation on Sunday rest in Belgium and abroad, of which the results have been published in five volumes (1896 to 1898). The programme consists in ascertaining as far as possible the nature, the frequency and the causes of dominical labour. In Belgium the investigations involved specially the industrial establishments and the great shops.

For the industrial establishments, the information was collected: 1° by inquests on the spot effected by the inspectors of labour and the mining engineers; 2° by a consultation of the Councils of Industry and labour; 3° by a consultation of the commercial and industrial associations.

In the great shops, the inquiries have been made by the agents of the provincial administrations.

The returns have been made out by establishment and in the shape of statistical tables and monographs reproducing for each establishment the whole of the data collected by the inquest.

Since the foundation of the *Revue du travail* in January 1896, a special department has been consecrated in this periodical to the statistics of strikes, and under this head is issued every month a summary report on the movement of strikes.

When a strike breaks out in an industrial establishment, it is the duty of the burgomaster of the locality to inform the Office of Labour of the event, and the latter sends blanks to be filled in. These documents are subject to an attentive revision as soon as they arrive at the Department. The data concerning the quinquennial

period 1896-1900 have been published in 1903 in a special publication *Statistique des grèves en Belgique* supplying in a series of statistical tables, complete information about 610 strikes having concerned 195,110 strikers.

The brilliant result attained by the statistics of wages of the industrial censees has encouraged the Office of Labour to proceed with its studies in this direction, registering by periodical inquiries the variations of the rate of wages in the great branches of industrial activity.

In this way, in May 1900, an inquest determined, according to the methods followed in 1896, the wages of more than 100,000 miners engaged in coalmining pursuits.

A comparative study of wages obtained in 1896 and 1900 has led to a statement of the variations in each coal-basin, in each coal-mine and for the principal varieties of skilled labour of the pit and the surface.

The results of this inquiry have been published in 1901 under the name of : *Statistique des salaires dans les mines de houille* (October 1896—May 1900).

A similar investigation concerning the wages in the textile industries has been undertaken in October 1901. It involves 72,512 labourers of which the wages and hours of labour have been determined in every desirable condition of exactitude. The returns of this inquest will be published in the course of 1904.

Finally an inquiry on the wages paid in October 1903 in the metallurgic industries is in course of execution.

In consequence, in a few years, and by the means of inquiries on wages, based on the data of 1896, the Office of Labour will travel over the entire cycle of the great industry in Belgium. In fact the coal mines with 120,000 labourers, the textile industries with 80,000 and the metallurgic industries with more than 10,000 labourers, constitute one half of the labouring population of Belgium.

The Office of Labour has not restricted its field of investigation to the works of pure statistics which have been mentioned. A certain number of problems of which the study would be incomplete if only considered under the numerical aspect, have been studied in the shape of monographs and inquests. The performance of this work has been entrusted to delegates which do not belong to the body of the officials of this institution.

As was stated before, the labourers working at home are

numerous in Belgium : 118,000, of which 41,000 males and 77,000 females, that is 15 per cent. of the total labouring population. It has seemed interesting to collect exact information on the economical and juridical situation of these labourers.

The industries which hitherto have been the object of monographs of this kind are :—

The industry of arms at Liege ;

The industry of clothes-making for males in Brussels ;

The knife-making industry at Gembloux ;

Linen-weaving in Flanders ;

Straw-plaiting in the valley of the Geer ;

Shoe-making in the flemish country, nail-making in walloon country, glove and lace manufactures, embroidery on tulle, wool-weaving.

These inquests, of which hitherto five volumes have been issued from 1899 to 1902, have been published under the title : *Les industries à domicile en Belgique*. The two last volumes are under the press.

As a complement of the inquests undertaken concerning the industries at home, some delegates were directed to go and study in France and Switzerland the economical consequences of the distribution of electric power in the home industries. The directing idea of this investigation was to determine the economical results which are the consequence of the introduction of electric motors in the watch making industry in Switzerland, the silk weaving in Lyons and the ribbon-manufacture at St. Etienne.

Besides the question had to be considered whether mechanical equipment made possible in the labourer's dwelling thanks to the distribution of electric power, is calculated to hinder or to delay industrial concentration.

The result of this investigation has been published in 1902 under the title : *Les moteurs électriques dans les industries à domicile*.

The statistics of wages such as they have been drawn up in the publication which we have been analysing just now, considered only the point of view of statics. It has been interesting to study also the labourer's income from the point of view of dynamics, that is to say, by not only taking into account the profit earned during one day of labour, but considering also the profits realised during a

BRUSSELS LACE.

**Separate piece to be applied on tulle,
made at Liedekerke (Brabant).**

rather long time and comparatively with the earnings of the family.

An investigation of this description entrusted to a special delegate, correspondent of Labour, is in course of execution; it applies to the wages in the cotton and linen industries in the town of Ghent. The first volume has been published under the title : *Les salaires dans l'industrie gantoise*.

The second volume of this work concerning the wages in the linen industry, is in course of preparation.

Inspection of Labour.

The inspection of labour is exercised by two classes of public officials : -

1° The inspectors of labour connected with the Office of labour;

2° The mining engineers.

The latter are only charged with the inspection of labour in the mines, quarries and metallurgic works.

Organization and Officials. The inspection of labour, properly so called, of which the number of officials has been increased in succession since the creation of the Office of labour, comprises at present a staff of 28 officials, of whom 15 inspectors or deputy inspectors, possessing a certificate of civil engineers, 2 ladies inspectors, 4 inspectors and 1 deputy-inspector possessing a diploma of doctor of medicine and 6 delegates to the Inspection of labour, of whom 3 workmen.

To the central administration are attached : -

1 general inspector;

2 principal inspectors, of which one physician;

2 inspectors;

2 ladies inspectors;

1 deputy-inspector.

In the provincial service are distributed : -

11 inspectors, of which 3 physicians;

6 delegates.

The kingdom is divided in nine inspection districts comprising each a chief district inspector, assisted, according to the industrial importance of the circumscription, by one or several substitutes or delegates.

The inspectors who possess a diploma of doctor of medicine, and exercise their office in a more extensive resort, have specially for mission to investigate in the establishments subject to the supervision of the inspection of labour, the general or local causes of insalubrity.

Besides a certain number of medical doctors are approved (*agréés*) to draw up the authentications and declarations prescribed by the regulations relating to the police of establishments classified as dangerous, unhealthy or inconvenient.

The ladies inspectors of labour are specially committed to visit the establishments occupying female workers such as sempstress, and milliner shops, &c.

Attributions. The inspectors and delegates to the inspection of labour have for principal mission to watch over the execution : -

1° Of the Act of December 13th 1889 concerning the labour of women, young persons and children in industrial establishments ;

2° Of the laws, regulations, and decrees concerning the establishments classified as dangerous unhealthy or inconvenient ;

3° In some districts of the kingdom, of the Act of May 24th 1898, concerning the police and supervision of the open air quarries ;

4° Of the Act of August 16th 1887, regulating the payment of wages to the workmen. This Act has been completed in succession by the Acts of June 15th and 17th 1896 and by the Act of July 31st 1901, regulating the measurement of the labourers' work ;

5° Of the Act of June 15th 1896 on the shop regulations at present applicable to all industrial and commercial undertakings occupying at least five workmen.

Besides these essential attributions, the inspectors of labour are still tasked with other secondary duties and are called to give to the authorities the advice and informations which may be asked of them, concerning the application of the laws and regulations which have just been mentioned.

Activity. Every year the inspectors of labour address to the head of the Department a detailed report on their work during the year elapsed. These reports form, at present, nine volumes and are published by the cares

of the Office of Labour. The medical inspection has published in 1902 a study on professional hygiene relative to the flax-mills.

Besides a monthly bulletin of the inspection of labour is published in the *Review of Labour*. It gives information on the number of visits made every month.

The figure of the establishments visited every year by the inspection of labour, since the creation of the Office of labour, and the returns of the working population occupied by the said establishments, are given in the following table :—

YEARS	NUMBER		WORKING POPULATION
	OF VISITS	OF SECTIONS OF VISITED ESTABLISHMENTS	
1895	6,898	5,791	218,826
1896	8,407	7,599	217,872
1897	10,265	8,648	210,767
1898	9,912	8,903	235,867
1899	10,282	9,421	252,965
1900	11,058	10,117	273,363
1901	9,075	8,233	218,850
1902	13,627	12,156	313,049

Provident Institutions.

Provident societies in Belgium are both numerous and flourishing. Thanks to the freedom of association guaranteed by the Constitution, there exist thousands of savings-banks, societies for giving assistance in case of sickness and death, working-men's clubs, and « patronages » for the young of both sexes; while none of these institutions have to go through any formalities with the authorities or to render an account of their management to them.

However, there are several laws which grant important privileges to such associations as register themselves in accordance with legal forms.

The law of June 23rd 1894, as to « mutualities, » i. e. friendly societies, compels the Government to recognize,

CHANTILLY LACE.

Flounce manufactured at Grammont (East Flanders).

i. e. to register by Royal Decree, the societies which demand it, and which fulfil the conditions imposed by that law : to this end it is particularly required that these societies confine their operations to the objects included under one of the four following heads, viz :—

I. To secure to the members and their families temporary assistance in case of sickness, injuries, disablement, or in the case of the birth of a child; to provide for funeral expenses, and to give temporary assistance to the family of deceased members;

To facilitate for members and their families affiliation with the savings, superannuation and insurance branches of the General Savings and Superannuation Bank guaranteed by the State;

II. To secure to the members compensation in case of the loss or sickness of cattle, or by damage caused to crops by calamities;

III. To facilitate for the members and their families, all others being excluded, by the accumulation of their savings, the purchase of useful articles and articles of food, implements of work, domestic animals, also articles to meet temporary and recurring wants, especially manure and seeds;

IV. To make loans to members, not exceeding the sum of 300 francs.

Moreover, the Government is authorized to recognize, provided that they conform with the provisions of the above law : —

1. Friendly societies whose constitution has in view objects at the same time pertaining to several of the categories enumerated above;

2. Friendly societies having as an objet the formation of a distinct fund for helping, by annual grants, aged or disabled members, or, after their death, for helping the members of their family. Such grants can never be raised except from income derived from capital or other annual sources; their rate shall be subject to revision at the end of every financial year, and cannot exceed the sum of 1200 francs per head;

3. Federations of recognized friendly societies.

Societies so recognized become the rights of corporations, they are exempt from several taxations, the funds which they distribute as benefits cannot be transferred.

nor seized; they also receive grants from the State and the provincial and municipal governments. They can also receive gifts and legacies when the same are authorized. Where the articles contain no provision to the contrary, the members are only responsible to the amount of the own liabilities to the society.

The dividing of the funds of recognized societies is prohibited.

Under such liberal and generous legislation, the development of the friendly societies has become more marked as years go on. The greatest possible encouragement has been granted by the State and the local authorities. An active propaganda has been carried out with the object of increasing friendly societies and improving their organization. The teaching and practice of thrift have been successfully introduced into both municipal and free schools. An increasing number of factories have given their workmen the opportunity of benefiting by these valuable institutions. The great majority of mutual associations have grouped themselves into federations, i. e. orders, which, by uniting their forces, have succeeded in improving the laws and the management of the associated societies, in extending their scope, and in making their action stronger and more widely felt. Pamphlets have been spread abroad in millions with the object of making known the doctrines of thrift and their application to modern needs.

The appropriation, provided for in the Budget of the Industry and Labour Department for the encouragement of friendly societies, has risen in successive years from 35,000 francs in 1896 to 350,000 francs in and continuing from 1900. Among the charges on this annual appropriation are included grants to help in starting thousands of new societies and federations, which seem to offer guarantees that they are solid and properly carried on.

Annual sums for compensation, amounting at present to nearly 100,000 francs have been granted to the societies, on account of information which they have supplied to the Government as to their working. From this information the Government has gathered the data of the statistics on the friendly societies which it has just published.

The activity displayed by the 60 registered federations has proved so satisfactorily that, by a measure of decen-

tralization and in the person of delegates approved by the Office of Labour, they have been entrusted with a part of the control of the accounts of the societies which are affiliated to them. To-day, offices for furnishing information, and for furthering the propaganda are subsidized by the Government, and are open, both to the societies and to the public, in all parts of the country.

Without counting the numerous societies for the insurance of cattle and for providing against other agricultural risks, the number of registered friendly societies, which was 204 in 1885, rose to 579 in 1894, to 1933 in 1898, and on December 31st 1903, it amounted to 6550.

The number of active members of these societies, which was 50,000 ten years ago, has risen to six hundred thousand.

Of these societies, 2130 have for their principal object to grant help in case of sickness; in ten years they have devoted fifteen million francs to their benefits and they have carried over to their reserve funds the sum of six millions francs.

One of the principal objects of friendly societies is to secure a *pension* for their members by means of affiliation to the General Superannuation Fund under the guarantee of the State. Bonuses have been granted for this purpose by the Office of Labour by means of a special appropriation, and rose, from the year 1898 to 1900 from 13,000 francs to 556,000 francs. These bonuses were at first allotted to 38 societies, comprising 3000 affiliated members; but in 1900, 1785 societies and 102,203 affiliated members participated in the allotment of these grants.

Such a favourable result met due consideration from the part of the Government and the two Legislative Chambers which did not hesitate to render this system of encouragement permanent : by the law of May 10th 1900, amended by that of August 20th 1903, an annual credit of twelve million francs, raised to fifteen million by the law of February 18th 1903, is paid into the special endowment fund for old-age pensions.

In pursuance of this legislation, an annual bonus of 60 centimes in the franc to the extent of their payment of 15 francs is granted by the State to all persons who satisfy the legal conditions. As a temporary measure, the affiliated who have reached the age of forty years on

January 1st 1900 will enjoy the bonus to the amount of 24 francs paid annually. The State intervention amounts to 9 respectively to 14,40 francs annually.

On and after January 1st 1903, the amount of the annual bonus, to the extent of the first 6 francs paid, was laid out as follows :—

A. One franc per franc for the affiliated who had reached an age between forty and forty five years on January 1st 1900;

B. Franc 1.50 per franc for the affiliated who had reached, on the same date, an age between forty five and fifty years;

C. Two francs per franc for the affiliated who, on the same date, had passed the age of fifty years (law of August 20th 1903). The bonus of the State may reach also for these last, fr. 22.80 yearly for 24 francs paid by themselves into the Superannuation Fund.

Each person affiliated possesses a separate depositor's book, which can neither be taken from him nor transferred. He is absolutely free to increase, lessen, or suspend his deposits to his own liking without incurring any forfeiture.

These legislative measures have developed throughout the whole country the movement of agreement with and affiliation to the Superannuation Fund through the medium of friendly societies, which has already made such remarkable strides, and have multiplied its effects five-fold. At the present time, the number of those who are affiliated to the Superannuation Fund exceeds half a million. The 4,597 societies into which they are grouped, received from the Government in 1903 nearly 3 millions francs in bonuses and subsidies. In ten years, the State has set aside 9 million francs to these encouragements of thrift with a view to old age.

But the law is not content with simply helping thrifty persons to make up pensions for the future. It also allows the granting, as a temporary measure and up to the year 1911, of annual sums of 65 francs to workmen over the age of sixty five who are in want. At the present time the number of these pensioners is over 200,000, and the service of these grants involves an expense of more than 13 millions francs being charged to the Public Treasury.

The General Superannuation Fund was created by the law of May 8th 1850. The law of March 16th 1865, established a General Savings Bank guaranteed by the State; the Superannuation Fund has been joined to this Savings Bank. It is an independent financial institution, which works under the control of the Government, and is entirely self-supporting : but it carries out the service of savings bank of old-age funds, and for the last ten years also, of life insurance at cost price and without having to pay either interest or dividends to share-holders, who do not exist. It centralizes the financial service of thrift concerning the old-age for the whole country, while its gratuitous administration is insured by decentralization among the committees of the friendly societies. The payments which these collect reach the Superannuation Fund by means of the post-offices.

The General Savings Bank, on December 31st 1896, could reckon a number of 1,238,601 depositor's books, representing deposits amounting to 481,160,337 francs; on December 31st 1902, these figures had risen respectively to 1,973,480 depositor's books and 730,563,054 francs, the proportion of depositor's books per 100,000 inhabitants rose from 19,185 in 1896 to 29,275 in 1902, i. e. the number of those practising thrift has increased by one half in six years, the amount of their savings having increased in the same ratio.

Payments into the Savings Bank are also made through the medium of the post-offices.

In pursuance of the law of August 9th 1889, there were established fifty five « Patronage-Committees » of workmen's dwellings and provident societies. These committees extend their operations over the whole face of the country and are committed to make a continuous enquiry into the moral, hygienic, and economic conditions of dwellings, to encourage the building and letting of healthy dwellings, and their sale to workmen, either for cash or by annual payments, further to encourage the development of thrift and insurance, as well as institutions of credit, friendly societies and superannuation. They are also committed to decide as to the merits of the demands for the grants of 65 francs made to aged workmen.

Thanks to the grants which have been made to these committees by the Industry and Labour Department,

several of them have been able to undertake the publication of studies on and inquiries into the question of the improvement of workmen's dwellings. With their help, the 158 societies which act as intermediaries between the Savings Bank and the workmen, have been able to advance to 30,000 of the latter a total sum of about 60 millions francs in order to make them owners of their own houses.

Moreover, thanks to the intervention of these committees, more than 50,000 other workers have been able to obtain important fiscal reductions anticipated by the law of August 9th 1889.

The loans made by these societies to workmen, thanks to the advances made by the Savings Bank, are generally authorized at 4 per cent. Four fifths of the workmen who borrow have at the same time a life insurance with the Insurance Fund annexed to the Savings Bank, so that, should they happen to die before the whole repayment of the annual sums, their families are freed from obligation by means of the capital sum insured to the deceased.

On December 31st 1902, only 121 out of 23,447 mortgaged debtors who had borrowed on these conditions had to be expropriated in default of the payment of their annual sums.

This organization, then, formed with the object of bringing property within the reach of the working-classes, has had a success which is proved by fourteen years of practice; and the Belgian system has been imitated by recent laws passed in France, Italy and elsewhere.

Accidents to workmen.

Up to the present time, the question of employers' liability was regulated by articles 1382 to 1384 of the Civil Code, and it was incumbent to the workmen to prove that the accident was due to the fault, negligence or imprudence of the employer or foreman or of another workman, otherwise, should the cause of the accident be unknown or should it be due to unavoidable circumstances, no reparation could be demanded from the employer.

The injustice of this system was apparent and among the various remedies which have been tried in order to

mitigate it, we have to mention the creation of a national Fund for the assistance of workmen injured by accidents. This Fund has been established in pursuance of the Act of July 21st 1890, with an original capital of 2 millions francs. It has been augmented through gifts by private individuals or local administrative bodies and it was stipulated that only the interest from the fund could be used. At the end of the year 1899, the fund amounted to 2,493,098 francs. In 1899-1900, 5312 persons have been aided to the extent of 233,003 francs. A special Committee of five members, appointed by the King, administers the fund.

Since the passing of the Act of December 24th 1903, provision is made for compensation for accidents to workmen in Belgium. The law applies to workmen employed in the factories, workshops, yards and other establishments or classes of trade defined by the law. Compensation is provided in the case of every accident occurring in these trades, which causes disablement lasting more than a week. If the accident results in permanent disablement of a complete or partial nature, or in temporary disablement, the compensation is to be an allowance equal to a fraction of the man's average daily wages. The compensation payable in respect of a fatal accident takes different forms, according to the quality of the relations dependent on the deceased, who are left. When an annual rent is to be paid to the workman or to his representatives, the employer must deposit the capital of the rent into the General Savings and Old Age Bank or into another approved institution. The employer is not compelled to do so, when his obligations have been insured by same approved insurance society or mutual association of employers. But as such insurance is not compulsory a special Guarantee Fund is to be founded in order to met claims arising from an accident. It will have the right to recover all monies paid in respect of such claims from the employer which has not effected an insurance against his liability.

All societies or funds undertaking insurance against employers' liability for compensation for accidents are to be approved by the Government and are bound to form reserve funds or give security as shall be fixed by official decree.

The law shall come into force in 1905, six months after the publication in the *Moniteur* of the last of the Royal Decrees which have to regulate its execution.

Trade-Unions.

The principle of the liberty of association, entered in the Belgian Constitution, governs the whole question of trade-unions or syndicates. To allow their formation and also to continue their existence *between the members*, no administrative authorization is required, neither could they legally be subject to any interdict whatever.

But, in order to become self-existent respecting everybody and constitute a *body endowed with civil rights*, distinct from the personality of the associates (corporations), legal interference is required : civil personality has been granted to trade-unions by the law of March 31st 1898.

As stated by this Act, the civil personification, for trade-unions, is the consequence of the registration of their statutes by a Government's commission, which verifies whether all the legal conditions are fulfilled. Moreover these conditions being manifold and of various descriptions, it would take too long to give here their full statement.

This regime has only been in force for about five years. Official statistics do not allow to make a census of the number of members incorporated in the registered trade-unions, as this number is not to be disclosed. The number of the unions themselves reached 108 at the end of 1900 ; —693 on December 31st 1903,— and was distributed as follows : 147 farmers' unions, 87 of cattle breeders, 25 of avicultors, 12 of apicultors, 1 of horticultors, 1 of dairy owners, 1 of viticultors, and 1 of horticultors-apicultors ; besides 6 *federations* of farmers' unions, forming an aggregate of 612 associations for the agricultural professions. All other social categories are thus represented only by 81 recognized unions, whereof 16 unions and 1 federation of unions between persons exercising a liberal profession ; 4 unions of employees, 9 unions of persons pertaining to different professions, 37 unions of industrial labourers,

7 of employers and 7 mixed (workpeople and employers combined).

Indeed, these 693 unions possessing legal existence impart only a very imperfect notion of the syndical movement in Belgium. The great majority of trade-unions shun every kind of official control. Every month the *Review of Labour*, published by the Office of Labour, devotes several pages to the relation of the most impressing episodes of their continual and extremely varied activity.

The syndical movement of our working classes has from its origine been ruled by the political character of its groupés. There are no doubt in Belgium as elsewhere, *neutral* or *independent* syndicates which always declined outspoken affiliation to any of the great political parties; such are namely the already old groups of the « *Ligue typographique* », « *l'Association verrière* », the Brussels' glove-makers, the textile labourers of the vale of the Vesdre (Verviers and its surroundings). But the greatest number of Belgian syndicates enjoys political activity. And even on certain circumstances, all the syndicates belonging to the same political opinion combine to form regional or national congresses. There is no instance of a congress which has combined at the same time the syndicates of different opinions. At the utmost, is it possible to come to a temporary understanding, in a limited region and for a special object, — between syndicates pertaining to different political parties.

Another characteristic feature, and a more recent one too, of our syndical movement is its evermore striking orientation towards the mutualistic principle. From merely resisting funds, which was their former character, trade-unions have a tendency to become a grouping with many aims, and to each of these corresponds a special fund : sickness fund, pension fund (old age), unwilful want of work fund, &c. Often they combine in addition an intelligence office for members out of work, a permanent secretariate, the publication of a professional newspaper, helps to widows in case of death, &c. Hence the syndical clubbing-fee, as a matter of course, tends to rise, and this new regime affords to the unions more steadiness; held back by the multifarious advantages offered to them, the members resign much less easily. One may state in

WORKROOM OF THE HIGHER TEXTILE SCHOOL AT VERVIERS.

addition that the general result for these mutualistic syndicates is a less combative tendency than that of their elders, for which the strike was the sole preoccupation and the only way to assert their vitality. At present, they endeavour to keep the cash, and if strikes are less inconsiderately resorted to, many syndicates deny systematically all assistance to members who strike without their committee's authorization. This new discipline, which is not yet followed in many cases, betokens the length of the progress performed within ten years.

Another consequence still of this new « regime », is the increasing frequency of the connexions set up between syndicates of masters and of workmen belonging to the same trade. Apart from the councils of industry and labour, which are organized in the different industrial centres in pursuance of the law, conciliation, in case of conflict, is becoming the rule in the great centres, between the delegates of the groups concerned, who are studying together within the limits of their respective powers, the means of coming to a peaceable settlement.

The last (not official) investigations on the number of the members affiliated to the different Belgian workmen's syndicates, returned the following figures : —

Socialistic syndicates : 80,583 men and 3,094 women in 1902; neutral or independent syndicates : 12,000 members (in 1902); catholic syndicates : 14,787 members (in 1903). No numerical data sufficiently accurate exist with regard to the strength of the liberal syndicates, the least numerous of all, and of which a certain number, especially in Brussels, are formed rather by craftsmen or small traders than by real workmen.

Labour Bureaus for unemployed.

In Belgium a special signification was at first attached to the name of *Bourses du Travail* (Labour Exchanges) viz : that of a merely gratuitous registry-office, corresponding to the institutions which in Germany are called *Arbeitsnachweise* and in England *Labour-Bureaus*.

That, up to the present time, those bureaus never enjoyed a great favour from the side of the working class, is also a truth well worth mentioning.

WORKROOM OF THE HIGHER TEXTILE SCHOOL AT VERVIER.

Charity is the ruling feature of the first institutions of private initiative, of which the object was to find work for the unemployed, in a general sense : not only for domestic servants, but also for industrial labourers.

In 1888, the charitable association *l'Œuvre des Chauffoirs publics* with the cooperation of the local Chamber of Commerce (patronal association) opened in Liege the first public Labour Exchange. Within a year the example was followed by another charitable institution, *l'Œuvre du Travail*, which opened in Brussels a second Labour Exchange. In a similar way, the Charleroy Exchange was founded by the Institution of night's hospitality, that of Mons by the Board of charity, that of Paturages by the official committee of patronage of benevolent institutions; that of Ghent by an association of manufacturers. Moreover, from the outset, these various institutions were granted encouragement in the shape of subsidies, by the communal administrations within whose boundaries their activity displayed itself. A few years afterwards, towards 1896, a few communes (Enghien, Alost, Schaerbeek, Saint-Nicolas, Mechlin) undertook of their own impulse, the creation of similar offices, directly connected with the municipal services.

All these institutions—and most of them do still exist—answer to the same preoccupation, to assist the unemployed in finding employment. But unfortunately, bearing in mind too exclusively their charitable aim, and too often unable, except that of Liege, to gain the sympathy of the working classes, they have become rather the usual refuge of the unskilled hands, whom they succeed in procuring temporary jobs, while the great majority of skilled workers keeps aloof from them. According to the statistics published monthly by the *Review of Labour*, the number of situations which they procure does not exceed 500 per month, for the whole country.

Recently, a new tendency has made itself manifest, of which the Communal Labour Exchange of Antwerp (opened in 1903) is the first expression, and a similar organization is in course of establishment in Ghent. In these new creations, the charitable character of the institution tends to disappear and give place to economical and social aims : to bring in contact the offer and the demand of labour, and as a consequence, to regularize the labour

market. With this view, the city of Antwerp has appealed successfully to the cooperation of the workmen's syndicates and the employers' associations, whose delegates constitute the supervision committee of the exchange.

But the experiment is too recent still to allow of interesting inferences being drawn from the same. The Government follows it attentively and has manifested its intention to encourage by way of subsidies the institution of Labour Exchanges.

Middle Classes

The study of the problem of the middle classes is a question which has been ventilated in 1896, at the Belgian Senate, pending the discussion on the budget of the Department of Industry and Labour.

The Government asserted its sympathy for the middle classes and emitted the opinion, that the development of professional education would contribute to enable them to improve their condition.

Shortly afterwards, the communal administration of the town of Ghent caused a local inquiry to be opened on the situation of the commercial and industrial middle class. Interesting reports were elaborated by several members of the committee of inquiry.

In 1897, in the course of the discussion of the budget of the above mentioned ministerial department, it was proposed to extend the inquest over the whole country, and to proceed to a national investigation on the situation of the middle classes, of a kindred type with that which was conducted in 1886 on the condition of the industrial workmen.

The Government declared itself favourably disposed towards this proposal, though reserving the choice of the time it would deem convenient to proceed to the investigation which was requested.

In 1899, the Minister of Industry and Labour created in his department a special office for the study of the problem of the middle classes. Deeming the isolation of the small traders people, to be one of the causes of their unfavourable situation, he directed this office specially to

canvass in order to develop among them the spirit of association.

This canvassing has been fruitful ; under this impulsion a great number of professional associations have been created ; syndicates of credit, of purchase, of equipment, of manufacture, &c. Several of these have created professional schools, &c.

In the meanwhile, two international Congresses of the lower middle-classes (*petite bourgeoisie*) were organized, the one in Antwerp in 1899, the other in Namur in 1901. The Government granted its high patronage and sent an official delegate as its representative to each of them.

In both these Congresses the problem of the middle classes was examined in its entire compass and numerous desiderata were stated by those whom it concerned.

Finally, a Royal Decree of April 10th 1902 instituted a Commission of 27 members, appointed to inquire into the situation of the middle classes interested with industry or trade, and to ascertain the proper and convenient measures to better their condition.

This Commission composed of members of both Houses, of economists and of small manufacturers or tradesmen is presided over by Mr. Cooreman, formerly Minister of Industry and Labour.

After having studied the methods employed for the local inquiry of the town of Ghent, as well as for kindred inquiries made in Germany and Austria, the national Commission definitely settled the program of its proceedings. It resolved to pursue the inquiry by three different methods :—

1. Oral inquiry ;
2. Written inquiry ;
3. Monographical studies.

It subdivided itself in a certain number of regional committees, which were to proceed in succession to the oral inquiry in all the provinces of the kingdom. This part of the investigation was completed on the 19th April 1894.

The written inquiry was made by means of lists of questions distributed among professional at the request of certain associations.

The monographies are studies embracing the whole of a profession in a town or in a region, or of institutions created in the interest of the middle classes.

Towards the end of 1904, the national Commission will complete the first part of its task : the inquiry on the situation of the middle classes; it will then be able to broach the study of the measures calculated to improve their condition.

In the meanwhile the Government did not remain inactive; it has organized temporary professional courses of improvement where the small tradesmen may acquire the notions they are lacking and get acquainted with the technical progress; it studies at present the question of the betterment of the equipment of the small manufacturers and of the artisans. Different measures have already offered the opportunity of being adopted from this last point of view : organization, in July next, in Ghent, of an international exhibition of small equipments; experimental lectures delivered in different parts of the country by an engineer specialist; competitions in order to realize new equipments for the trades of small tradespeople; creation of professional museums.

In 1902, the Government sent official delegates to the International Congress of the *petite bourgeoisie* which assembled in Amsterdam (Holland). This Congress investigated specially the question of the creation of an international organism for studying the problem of the middle classes. A Commission, appointed by this Congress and composed of Belgian and Dutchmen in equal numbers, was actively busy with this object. Its efforts were rewarded, so that on September 1st 1903, at a meeting at Stuttgart (Germany) was founded the *International Institute for studying the problem of the middle classes*. The object of this Institute is to combine through the medium of its central office, all the legislative dispositions enacted in the different countries in favour of the middle classes, and the detailed informations, reports, &c., on all organisms created in favour of the middle classes; to look for all works published on this subject and to draw up its bibliography; it can also publish the works of its members. Finally it can call forth the study of special questions either in general assemblies reserved to its members, or in Congress.

The International Institute is administered by a Committee composed of two effective members and two substitutes for each country represented. The presidency

belongs in succession to each nationality represented in the committee; the president is elected for a term of three years.

The permanent secretary's office is established in Brussels; and is directed over by the Director of Industrial and Professional Education at the Department of Industry and Labour, secretary to the national Commission of the lower middle-class.

INDUSTRIAL AND PROFESSIONAL EDUCATION.

The Direction of industrial and professional education—Industry and Labour Department—comprises in its province the technical, industrial, professional, commercial and domestic training schools, subsidized by the Government and subject to its inspection.

According to the last general report on the situation of industrial and professional education, the number of institutions subsidized by the Government was 579 on January 1st 1902.

These figures are distributed as follows : -

A. Professional schools for girls.

1° Domestic training schools and courses	292
2° Workshops for apprenticeships.	4
3° Professional courses	3
4° Professional schools	49

B. Professional schools for boys.

1° Apprentice workshops and professional courses of weaving of the Flandres.	38
2° Apprentice workshops for stone-cutting.	19
3° Professional courses	22
4° Professionnal schools	36
5° Saint Luke schools	5
6° Industrial schools and courses	79
7° Superior schools	13

C. Commercial and scientific courses

Total. 579

In 1901, the State expenses for subsidized technical schools amounted to 1,197,420 francs. These schools included at that time 2801 professors and 46,538 pupils.

We will proceed with a few short explanations concerning each kind of institution classified in the preceeding table.

Professional education for girls.

This education includes :—

Domestic training classes and schools ;
 Professional domestic training schools ;
 Domestic training professional schools ;
 Professional schools ;
 Apprentice classes and workshops.

Each of these institutions is intended for a special category of pupils and possesses its own organisation.

Belgium may claim the honour of having taken the initiative of organising practically the domestic training education. The first schools of this description were established in 1889.

The domestic training classes and schools have an exclusively practical teaching; the duration of the curriculum is generally one year, but it may also last two years.

The practical exercises include : maintenance and cleanliness of dwellings and furniture; washing and ironing of clothes and linen, cutting, making and repairing of usual garments; cookery, and in the rural communes the care to bestow on the garden and poultry-yard.

The theoretical lessons comprise lectures on hygiene and domestic economy and on children and sick nursing.

Domestic training education is only intended for the daughters and children of the working-classes, and has for object to teach them how to manage a household with order and economy.

The professional domestic training schools have also as principal branches practical works : the programme comprises, besides, some notions of arithmetic, french or flemish, hygiene and domestic accounts. The curriculum lasts two years, and sewing and dress-making form the most important parts of it.

The domestic training professional schools and the professional schools divide the time of study by halves, between theoretical courses which generally take place in the morning and professional courses which take place in the afternoon. The curriculum of these studies is from three to four years.

It is in the province of professional education properly

so called, that progress has been most remarkable during the latter years. The number of schools has greatly increased. Their organisation and their eminently practical character has made them great favourites with the parents.

Design is taught there in the professional point of view;

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besides sewing and dress-making, millinery, artificial, flower-making, embroidery, China painting, commercial book-keeping, typewriting, shorthand, domestic economy, &c.

Professional education for boys.

Apprenticeship in the workshop as it was understood in former times does hardly exist any longer now.

The Belgian Government have thought fit to leave to private initiative—that is to say, to trade-unions, syndicates, manufacturers, municipalities, —the care of orga-

nising apprenticeship, in the form of teaching, wherever the necessity be recognized; the Government's action is limited to encouraging all happy initiatives, in any shape whatever they appear; its intervention confines itself to the direction and general supervision of the professional education establishments, leaving to the promoters the choice of the methods, which, if properly applied, may all render services.

In fact, experience has shown that, on the whole, the workshops, classes and schools, created by private action and assisted by the Government, are very profitable to the working people.

There are professional schools of every description and for all trades, according to the necessities of the various regions of the country. There are mechanical engineering schools, schools for the industries of iron and wood, schools of plumbers, of watch-making, of chiselling, of jewellery, armoury, book-binding and gilding, painting, spinning, dyeing, tanning, basket-making, &c. : schools of upholstery, tailoring, joining, typography, &c.

Each of these institutions is adapted to the habits the uses and customs of the regions where it is established; all of these without any exception have for their principal object the learning and study of drawing adapted to the profession. Almost all inscribe in their programme some theoretical notions and the technology of the trade, but practise always widely prevails over theory.

The lessons are given in day-time or in the evening; here they are gratuitous, there they are paying, elsewhere the apprentice is paid for the useful labour which he executes; in other cases, a syndicate of masters supplies and remunerates the work to the pupils. In certain schools the apprentices are kept apart from the workmen and their instruction is supervised by special foremen; in others they work with the artisans to execute the orders under the direction of the foremen who manage their professional education.

These shops and schools cannot pretend to form perfect artisans who have nothing more to learn when leaving the institution. Moreover skill is only acquired by practise; the school must especially endeavour to teach general knowledge necessary for the practise of the trade, and to complete these notions with theoretical courses and

drawing, these branches being indispensable to form useful helpmates in industry.

The 19 apprentice shops for stone cutting are generally organised in shops belonging to manufacturers. They are established in the quarry itself, in shops specially fitted up for the purpose. The work is supervised by a foreman. The raw material is supplied by the quarry master and the labour is paid according to an approved tariff.

The 38 apprentice shops and the professional courses of weaving in the Flanders are establishments of professional teaching, intended to keep the artisans of the country on the level of modern industrial progress. Frequentation of the shops is free of cost. The curriculum is generally limited to two years, however, the apprentice who desires to improve further still is allowed to stay longer. The time daily given to the practical exercises of weaving is on an average from nine to nine hours and a half in winter, and ten to eleven hours in summer time. A sitting of one hour a week is consecrated to theoretical teaching and specially to the study of twillings and decomposing the samples. As very close relations exist between manual labour and professional instruction, it may be said that the labour executed by the apprentice is the constant application of the foreman's lessons, who points out his failings or negligences and assists him in the difficulties of the trade.

There are 4 schools for sea fishery, two at Ostende, one at Blankenberghe and one at Nieuport.

Saint Luke schools.

The schools of Saint Luke, managed by the Brothers of the Christian schools, have for their principal object to assist apprentices and artisans' sons, to acquire the necessary theoretical and practical knowledge to get an honourable living.

They are more specially applied to the trades of industrial art, and have a tendency to raise again and revive in the country the ancient traditions of our national industry. The pupils are taught architectural design, wood and stone carving, artistic iron working, and drawing in its relations to bookbinding and printing, decorative pain-

ting, glass-painting, &c. There are schools of this description at Ghent, Schaerbeek, Tournai, Liege, Molenbeek-Saint-Jean.

Industrial schools.

The industrial schools are institutions of popular education comprising a general curriculum useful to all frequenters, completed by special lessons adapted to the industrial, professional and commercial requirements of each of them.

The essential feature of these institutions is that they imply especially theoretical education, while the professional schools endeavour especially to impart manual education.

The object of the industrial schools is : to give to the artisan such knowledge as he cannot acquire in the shop, to develop his intelligence by initiating him to the knowledge of the general laws which rule the transformations of matter, to increase in this way the economical value of his labour, finally to put him in a position to contribute to the increase of production and the raising of wages.

But, besides the educated artisans, a capable *employé* is also required, possessing a general knowledge of the specialty with which he occupies himself. This indispensable help of the manufacturer and merchant, must also be formed at the technical school. He will find in most industrial schools the necessary complement of studies to finish his education. Beside these schools, in the important localities are special courses for accountants and commercial clerks.

In the towns, and in the mining, industrial and manufacturing centres, these schools, of which the programme is adequate to local requirements, are specially well frequented and supplied with the necessary collections and libraries.

A great number of these institutions have rendered precious services to the working class and to industry.

The industrial schools are divided according to the importance of their program in industrial courses, industrial schools, properly so called, and industrial higher schools. Hitherto there are no more than two industrial higher schools, at Charleroi and at Mons.

Higher Special Schools.

Under the name of *Higher Special Schools* are comprised all technical schools where theoretical studies are carried on much further than in the establishments of secondary education. These schools are intended for a class of young men who have completed their secondary curri-

COLLECTIONS' HALL OF THE SUPERIOR COMMERCIAL INSTITUT, ANTWERP.

culum and whose aim is the management of a commercial firm, of a shop or factory, or an appointment to a remunerated consulship. The courses take place all day, and the curriculum lasts three years. The Department of Industry and Labour subsidizes 17 Higher Schools.

There are seven commercial schools or institutes : the Superior commercial Institute of Antwerp ; the Superior commercial school in connection with Saint-Ignace's Institute, in Antwerp ; the Superior commercial school connected with the Saint-Louis Institute, in Brussels ; the School of higher commercial and consular studies of Liege ; the commercial and consular school connected with the University of Louvain ; the Superior commercial and consular school of Mons, and the commercial Institute of the Manufacturers of Hainaut at Mons ;

One school of Arts and Trades at Pierrard-lez-Virton ;

Three schools and Institutes of Brewery and Distillery of which two at Ghent and one at La Louvière ;

One Higher Textile School at Verviers ;

Finally the provincial school of industry and mines of Hainaut, at Mons.

Scientific and commercial courses.

The scientific courses, which are alluded to here, are courses organised by the Communal Administration of Brussels in order to diffuse science among adults.

As for the special courses of commerce and languages, they are generally founded by syndicates of travellers or clerks' clubs. These institutions have for object to diffuse the commercial sciences and to improve the study of modern languages. With this view they organise evening courses easily accessible to young men engaged during day time in commercial or industrial pursuits. These courses are a useful, and necessary institution ; they allow pupils to obtain in Belgium better remunerated situations and to look for new opportunities abroad. In order to acknowledge the services rendered by these institutions, the Government have assimilated these establishments, as regards the subsidies, to industrial schools and intervene yearly for one third of the approved expenses.

All the schools subsidized by the Department of Industry and Labour are visited at least once a year by one of the members of the General Inspection of Industrial and Professional Education.

The Inspection emits its opinion concerning the pro-

grams, the appointments of the teaching staff, the progress of the studies, the budget and expenses of the different institutions. These State officials attend to the examinations and controll the granting of certificates to the pupils.

The recruiting of the teaching staff is specially cared for. With regard to the special courses of industrial and professional schools for boys, the State as a rule approve only the appointment of civil engineers, technicians or specialists. With regard to the domestic training schools, temporary courses are organised yearly by the State during the summer vacations, to form capable teachers.

The extension of the technical schools for artisans and clerks is one of the measures which are the object of the greatest care of the Belgian State, though respecting always the principle of the liberty of teaching. The Minister of Industry and Labour when presenting the report published in 1902, declared he would not hesitate to solicit from the Legislative Houses the necessary credits to secure the development of this Education, which powerfully cooperates to increase the moral and material prosperity of the country.

SUPERVISION OF INDUSTRIAL ESTABLISHMENTS

Administration of mines; its competence.

The legal regulations on mines in Belgium are grounded on the French Act of April 21st 1810 and the decrees issued in the sequel. The Acts of May 2nd 1837, and of July 8th 1865, have amended in some respects the original legislation, but have not affected the essential principles or made any change in the administrative supervision. Schemes of different laws are at the present time laid before legislature, with a view of regulating anew the ownership of mines, such motion having been called forth by the recent discovery of an important coal-field in the north part of the country. The Government resolved to propose the revision of various provisions which have given place to just criticism in their application, and it may be presumed that in consequence our mining legislation will shortly undergo certain alterations, to accommodate it better with the requirements of present times.

The mines may not be worked, even by the owner of the soil, except by virtue of a concession from the Government. They are capable of being conceded to third parties, but the owner of the surface in that case is entitled, by way of compensation, to a royalty which may amount to 3 per cent of the net proceeds of the working.

Every Belgian and even every foreigner, acting by himself or as a company, has the right to claim and can obtain a concession. The discoverer and the owner of the

soil enjoy a preferential right. The concession is only granted on condition of justifying necessary means to undertake and conduct the works, and to pay off the royalties and allowances prescribed by the act of concession.

The mines are burdened to the benefit of the State with two royalties, one of which is fixed and estimated according to the extent of the concession; the other is proportional to the net product of the mine. Besides this, the Government regulate the royalties the owners of the surface are entitled to.

The administrative supervision has a threefold object:—

1° The keeping of the mine with regard to the rational working of the mineral deposits and supplying the wants of the consumers;

2° The protection of the surface and in general public safety;

3° To attend to the safety of all persons employed in the works.

The Act of July 2nd 1899, applicable to the mines and their dependences, enables the Government to take fit measures to secure the salubrity of the works and the workshops.

As chief of the executive Power, it is in the King's province to make regulations for the police of the mines. The Royal Decree of April 28th 1884, has enacted a complete set of measures of security adapted to the working of mines which is inspired by the progress realised in mining science, by the present state of development and management of underground works, and also by the dangers specially inherent to certain deposits. This Decree was modified and completed by the decrees of December 13th 1895, regulating the use of explosives; that of October 13th 1897, on the conveyance of men in the shafts, and that of September 5th 1901, on the ventilation of fiery mines.

The minieres (open mines working alluvial iron ore, pyrites, or alum shales) and the large metallurgic works are still regulated by the Act of 1810, their working is subordinate to a licence granted by the Government, who issue the special prescriptions to comply with. To work peat bogs a license is required from the provincial authorities. Quarries according to the Act of May 24th 1898,

are submitted to the regulations concerning the police of dangerous, unhealthy and inconvenient establishments.

The State Mining Staff.

The staff of the State Mining Engineers is charged,—under the authority of the Minister of Industry and Labour,—with the execution of the laws, regulations and decrees concerning :—

1° The mines, the minieres, the underground quarries and the factories ruled by the Act of April 21st 1810, and also the open air quarries with regard to their working;

2° The peat-bogs in the provinces of Hainaut, Namur, Luxemburg and Liege;

3° The steam-appliances : (a) in all the private establishments and in those which depend upon the communal and provincial authorities of the mining provinces (Hainaut, Namur, Liege and Luxemburg); (b) in the private establishments administered by the Act of April 21st 1810, existing in the other provinces; (c) in all open quarries of Brabant situated in the judicial district (*arrondissement*) of Nivelles, and in the part of the Brussels district south of the road from Nivelles to Hal and Ninove. Nevertheless the superintendence of steam engines used for navigating purposes or directly connected with navigation, belongs exclusively to the province of the civil engineers of bridges and highways, in the whole extent of the Kingdom;

4° The stores of explosives in the mines, minieres and quarries situated in the provinces of Hainaut, Namur, Luxemburg and Liege as well as in the above-mentioned southern district of Brabant;

5° Establishments classed as dangerous, inconvenient or unhealthy in connection with mines, minieres, subterraneous quarries and factories administered by the Act of April 21st 1810, as well as the coke oven plants and briquette works whether annexed to, or apart from the collieries.

In what concerns the Labour regulations, the mining engineers are directed to controll their execution in the establishments specified above, 1° and 5°, as well as in the open quarries.

A General Director is at the head of the State Mining

Staff. The members of the staff in active service form two categories : 1° the engineers belonging to the Central Administration; 2° those who attend to the ordinary Service in the provinces or are attached to special Services.

The territory of the Kingdom is divided, with regard to the mining Service, into two General Inspection districts, each of which is subdivided into circuits and these into districts, according to the extent and importance of the Service.

The General Inspectors have the supreme supervision of the service in the provinces; one resides at Mons, the other at Liege.

There are 9 mining circuits : 2 at Mons, 3 at Charleroi, 3 at Liege and 1 at Namur; a Chief Engineer is placed at the head of each circuit. Principal engineers are attached to the General Inspectors and Chief Engineers, to assist them in the discharge of their duties. The ordinary engineers are divided into 3 classes and charged with the supervision of the districts.

The purpose of the Administration is essentially preventive; it endeavours to promote, more by persuasion than by way of authority, all operations and rules which mark a progress in the limitation of the number of accidents or of their disastrous consequences. Technical Committees instituted to investigate, from a scientific point of view, accidents which have occurred in mines and factories, render great service in this respect. These Committees are composed of Inspectors of mines of every rank, in office in each of the mining circuits, under the presidency of the Chief Engineer. A complete copy of the proceedings of these Committees is forwarded to the General Director of Mines.

A special Office, the Office of mining accidents and fire-damp, in connection with the Central Administration, is charged with collective studies on mining accidents and especially of those caused by fire-damp. This Service possesses a very complete experimental laboratory established by the Belgian Government at Frameries, with the kind assistance of the *Compagnie de Charbonnages belges*, for the detailed study of the multifarious questions relative to explosions of fire-damp and coal-dust. The experiments are carried out with natural fire-damp collected in the underground works of the pit *Grand-Trait* in the

Agrappe colliery. The gas is conveyed by canalisation into a purifier and from there into a gasometer where it is stored in order to be used for testing explosives or lamps. The Testing Station of Frameries includes, besides a gallery for experimenting explosives and sample specimens of lamps, a station for the gauging of anemometers.

With the Central Administration of Mines are connected the General Inspection of Explosives and the Geological Service, which has the special charge of keeping up to date the detailed Geological Map of the Kingdom. The Service of Mines in the provinces is charged with the drawing up of the general map of mines.

Inspection of mines by workmen.

The Act of April 11th 1897, has appointed workmen as deputies for the supervision of coalmines. These inspectors are appointed by the Government for a term of three years, on the proposal of the competent Council of Industry and Labour. To be legally qualified for such proposal they must be at least thirty years of age and have exercised practically for at least ten years, one of the branches of underground mining work, and offer certain guarantees with regard to their education and capacities. The age of eligibility may be reduced to twenty five years and the period of exercise of their trade to five years in the case of workmen or supervisors possessing a Certificate of ability, delivered by an industrial or professional school.

The delegates are remunerated by the Government. Their duty is : 1° to examine the underground works with regard to the salubrity and security of the workmen; 2° to cooperate in the authentication of accidents and in the examination of their causes; 3° to notify, should they occur, infringements of the laws and decrees on labour, the execution of which the mining engineers are charged with attending to. The delegates are compelled to descend at least eighteen times every month in the mines of their resort. The number of workmen's circumscriptions is fixed by the law at 35 at least and 45 at most. At the present time they are 39 in number, 29 in the province of Hainaut, 1 in the province of Namur, 9 in the province of Liege.

- **Annales des Mines de Belgique.** -

Under this head a Royal Decree of March 9th 1896, has created a special periodical review, to publish reports and documents relating to mining science, to metallurgy and industrial arts, especially in connection with the security and hygiene of the working people. This publication is under the Direction of a Committee composed of the General Director of Mines, the General Inspectors and of four other members chosen among the chief and the principal mining engineers.

The *Annales* are issued quarterly, in numbers containing about 200 or 300 pages. Collaboration is open to all competent persons. Contributions can only be inserted with the approval of the Directing Committee. The latter assume no responsibility with regard to the opinions and criticisms of the authors.

The *Annales* publish extracts of the administrative reports offering general interest with regard to the progress realised in the mining science, to the safety of labour and to the prosperity of the national industries; besides, the official statistics and the legislative and administrative documents of all countries.

Mining Workers Relief Institutions.

To the associations known by the name of *Common relief institutions for mining workmen* is devolved the mission of securing within the boundaries of their means, the alleviation of the state of mining labourers victims of accidents at mines or incapable of working through old age.

The common relief institutions of the Kingdom are associations formed between the owners of mines situated in the same territorial circumscription. The whole of the Belgian coal-basin is divided into six circumscriptions forming the respective departments of the relief institutions of the Couchant of Mons, of the Centre, of the basin of Charleroy, of Namur, of the province of Luxembourg and finally of the province of Liege.

These institutions were established during the last century (from 1839 to 1844) after various terrible disasters had severely afflicted the mining population. In the beginning these institutions only involved a temporary engagement of five or six years for the affiliated mine owners.

At the time of their foundation, their exclusive aim was to avoid the grievous consequences of accidents. It is only little by little that retiring pensions were granted. This motion has constantly been increasing and at the present moment in the Relief Banks of Liege and of the Centre the service of the retiring funds is more considerable than that of the accident funds. Just the contrary occurs in Namur where hardly any retiring pensions have been granted.

The Act of March 28th 1868, which raised the Relief Banks to the rank of public institutions, enjoying the privileges appertaining solely to corporations, rendered them permanent. This permanency secured the continuity of the deposits of the affiliated members and the constitution of a reserve fund to secure the obligations which the bank had contracted.

The organization of the different banks according to their statutes, approved of by the Government, is subject to uniform principles.

The association is voluntary between the owners, and the submission of the workmen is secured in each associated mine by the regulations of the establishment.

The management of the banks is entrusted to administrative committees presided over by the Governor of the province or the *Commissaire d'arrondissement* and composed — besides the Chief mining engineer of the district or his delegate, member by right, — of the delegates of the affiliated owners, and of the delegates of the workmen employed in the workings. The latter, overmen, overseers or workmen are appointed by the general assembly of each bank, either directly or after presentation by the workmen of the associated establishments. At the bank of the Couchant of Mons they are elected directly by the workmen who are members of the Councils of Industry and Labour of the district.

Jointly with the latter exists a permanent committee of the Relief Institutions of the Kingdom, the members of

which are appointed by the King; this committee is charged with giving an opinion on the execution of the law of 1868 and on the revision of the statutes of each bank.

The object of the Relief institutions is to supply ordinary pensions to the widows of miners who have perished accidentally, to the father and mother whom they supported, and to the orphans until of age to provide for themselves.

Ordinary pensions are also granted by the relief institutions of the basin of Charleroy, of the Centre and of the Couchant of Mons, to the aged labourers incapable of working.

Besides these ordinary pensions, the administrative committees are authorized to grant extraordinary assistance to the parents of the victims of accidents having no rights to the pension, to the injured workmen who are not incapable of working and also to the aged and disabled workmen (Banks of the provinces of Liege and Luxembourg).

The resources of each institution are composed of the reserve fund, of the subsidies from the State and the provinces, of the contributions supplied by the affiliated owners, amounting to so much per cent of the wages paid to the workmen occupied in their establishments.

In the Banks of the Centre and of Luxembourg a sum equivalent to these contributions is withheld from the labourers' wages.

The rate of pensions and aids, which varies according to the funds, is ruled by a fixed tariff taking into account the degree of incapacity, the quality of the labourer, the need, and eventually the age and the number of years of service.

Beside the common relief institutions, charged with the service of pensions and statutory helps, there is in each affiliated establishment a private help fund which provides for the needs of the injured workmen and their family during the interval between the accident and the admission to the pension. This interval varies from three to six months.

This fund is supplied exclusively either by the owners or with contributions from the workmen.

In 1901, 127 workings were affiliated to the common relief institutions, comprising 134,039 workmen. 20,756 workmen have been assisted, the average figure

of the help granted amounting to 140 francs. The receipts of the public institutions have reached all together fr. 3,854,897.83, and the expenses fr. 2,962,982.04. On the other hand the private institutions have received fr. 2,390,959.56 and have paid fr. 2,336,541.44.

In the future these institutions will be charged with securing allowances for all accidents happening to coal-miners; with this view they will be organized anew, so as to be able to comply with the obligations imposed by the law of 1903.

Regulations on steam engines.

The use and supervision of steam-engines are amenable to police regulations specified by the Royal Decree of May 28th 1884. These regulations determine the mode of administrative instruction concerning the applications for license, and enact certain rules of construction and safety, with which the boilers must comply, they also organize the regular and yearly supervision of all steam apparatus. This Service of supervision is divided between the Inspectors of mines and the Engineers of bridges and highways. A permanent consultative Commission, appointed by the Minister, and admitting members who do not belong to any public administration, is charged with interpreting, in case of need, the afore-mentioned regulations and expressing an opinion whenever any cause exists of derogating from them.

Regulations of explosive products.

To promote public safety, the Government regulates the manufacture, storage, sale, the conveyance by land and water, the mode of employment and the carriage of powders and all explosive substances.

The general regulations of October 29th 1894, have ranged explosive products in six classes: powders, dynamites (explosives with a basis of nitro glycerine), difficultly inflammable (with a basis of ammonium nitrate), rockets, pyrotechnics and safety ammunition; these regulations prescribe special safety measures for each of these classes.

The official recognition and classification of explosive products are effected by ministerial decree.

The store-houses and depositories are divided into categories regulated by special bye laws according to their service and their capacity; they are subjected to special day and night supervision, excepting the depositories of minor importance which on account of their situation are not amenable to these regulations.

Dynamite and generally all shattering explosives are the object of severe regulations with regard to the control of their use. In the factory the cartridges are stamped with particular marks and a register number. A very strict account of these cartridges is exacted whenever they change owner or holder. These precautions facilitate judicial investigations in the event of embezzling or robberies.

Direction of Industry.

With regard to industrial interests other than mines and large metallurgic works, the competent authority is the *Direction of Industry*, which is a department of the Ministry of Industry and Labour.

To this administration is attached the *Inspection of Industry*, the object of which is to study all matters relating to the conditions and resources of the industries in connection with its Service and to point out the measures for securing their protection or development.

The *Superior Council of Industry and Commerce*, which was established by a Royal Decree of July 16th 1890, and reorganized by another Decree of January 15th 1896 is connected with the Direction of Industry, together with the Foreign Office. It is a consulting Board, whose functions consist in giving their opinion on questions concerning industrial and commercial matters referred to them by the Government.

This Council is composed of 66 members : 44 for industry and 22 for commerce. Forty eight councillors are elected by delegates nominated by the manufacturers and traders; these are divided into forty one classes forming ten groups. The others are chosen by the King. Moreover, the Government appoint officials to attend the

sittings, with a right of discussion but not of voting.

The Superior Council of Industry and Commerce hold their general meetings at Brussels at the dates fixed by the Minister of Industry and Labour, at least once a year.

We shall recall to mind, that in all matters concerning labour, health and security, the industrial premises, other than mines or large metallurgic works, are subjected to the *Inspection of labour*, as stated in the chapter devoted to social economy.

GEOGRAPHICAL AND GEOLOGICAL SKETCH OF THE COUNTRY

WITH REGARD TO MINES.

The centre of the mining industry lies in the southern part of the country. The soil of this district is composed of rocks of the primary formation and includes several remarkably well developed deposits. It is traversed and opened up by numerous valleys which impart to it an eminently picturesque character while facilitating the extraction of the mineral wealth. Amongst the latter may be mentioned the slates, flagstones and whetstones of the Silurian beds of the Ardennes; the marble, freestone and paving stones of the devonian formation of *Entre-Sambre-et-Meuse* and Condroz; the *petit granit*, lime and cement, several ores and especially coal, in the carboniferous system.

The carboniferous system traverses Belgium in its entire width from S.W. to E. From the South of Mons to Liege it is represented by its two lower strata : the *Dinantian strata*, composed of calcareous rock and dolomite; and the *Westphalian strata* which represents the real coalfield which is subdivided into two parts : the lower and the upper coal measures.

The base of the *lower coal measures* consists of flinty slates and ampelites extremely black siliceous shales, followed by grit, sand stones and felspar grit with a few thin layers of close burning coal, and which merely give employment to a few small local firms. This substratum corresponds to the « *Millstone Grit* » in England and to the sterile sandstone : « *Flötzleerer Sandstein* » of Westphalia.

The *upper coal measures* contain shales, sandstone and grit and numerous coal-beds. At the present moment they are actively worked in the provinces of Hainaut, Namur and Liege, and have been lately discovered at a great depth beneath newer formations in the provinces of Limburg and Antwerp. Secondary and tertiary formations extend over the whole of lower and central Belgium, they supply sandstones, chalk, phosphate of lime, fire-proof clay, sand and clay.

Existing coal-fields. The coal formation extends in a narrow strip in connection, towards the west with the coal basins of the *Nord* and *Pas-de-Calais*, and eastwards with the *Aix-la-Chapelle* coalfield; the length of the coal formation is 170 kilometres, whilst in breadth it varies from 3 to 15 kilometres. The workable area is estimated at 1380 square kilometres. This strip is not continuous, but suffers a relatively unimportant break caused by a local upheaval of the carboniferous limestone at Samson in the province of Namur. From this point the whole of the formation slopes, on the one hand, westwards to form the Hainaut basin, and on the other hand eastwards, to form the basin of Liege. The depth of the trough westwards of the town of Mons, is estimated at 2400 metres. At Liege, it probably exceeds 1500 metres.

The western part is subdivided into four principal working centres: the basins of the Basse-Sambre, of Charleroi, of the Centre and of the Borinage or Couchant de Mons.

The coal formation reaches its highest development near the French frontier, in the Borinage; the total thickness of the coal formation is estimated at 2100 metres and the number of workable seams at 120. The thickness of these seams is as a rule not considerable, the thickest except some local widenings not exceeding 1^m,70. The total thickness of the coal formation is estimated at 70 metres i. e. 3^m,20 per 100 metres of ground. The upper strata, which contain seams of cannel coal, so called *Flenu*, is not to be found in the other basins. Thus in the Charleroy and Liege coal-fields there are only from 40-50, geologically distinct, workable seams, and the thickness of the coal-formation is only 1500 metres. In fact however, owing to the foldings and slips of the

deposits, the number of superposed layers in the same vertical line is considerably greater.

Since their deposit the coalbeds have been strongly driven back from South to North causing more or less extensive foldings, which form at times very acute angles and have produced a series of steeply inclined and flat seams, with a dip towards the South; these are succeeded by seams having a decided flat dip and tending to become more regular. In the « Couchant » of Mons the first horizontal seams or *Comble du Midi* dip towards the North; afterwards they subsequently rise in the opposite direction to form the opposite declivity of the basin called *Comble du Nord*.

The movements of the earth's crust have given rise to numerous faults which dip—though generally but slightly—towards the south; a few are horizontal, and produce reversed hitches, i. e. causing the roof to creep over the wall, at times, over a distance of several hundred metres. Towards the southern boundary, overlapping patches formed by masses of older formations, carboniferous limestone, devonian or even silurian, have been driven back into the coal deposits where they have remained at times more or less isolated, in consequence of subsequent denudations. The accidents of Boussu, Landelics and Bouffiuulx were the result of such disturbances.

BELFRY OF MONS.

In Hainaut a very interesting phenomenon is noticeable

viz : the *natural pits* or *circular faults*. These consist in great excavations the diameter of which sometimes reaches a hundred metres, with walls perpendicular to the coal-layers, and filled with fragments of various rocks, shales, grit stone or coal mixed with plastic clays, marls, flints and green sand stones, which are contained in the superposed cretaceous formation. It was in one of these excavations, at Bernissart, near the French frontier, that numerous fossil remains formerly unknown in Belgium were found ; among these were several complete skeletons of gigantic reptiles of the genus *Iguanodon*, at present kept in the royal Museum of Natural History, at Brussels.

Another important geological perturbation is the *Great fault of the Midi* which extends without interruption from the Pas-de-Calais to the province of Liege, and which has thrust up the beds of the lower devonian along a slightly inclined plane above the coal formation.

The basin of Liege possesses two remarkable examples of vertical faults : that of Seraing in the South and that of Saint-Gilles in the North ; the former has an opening of 10 meters and throws up the layers 250 meters in a vertical direction.

As regards quality, Belgian coal may be classed in four categories :—

1° *Long flaming coal* (charbons Flenu) containing 30 to 45 per cent. of volatile matter, with shining fracture and well marked rhomboidal cleavage, suitable for the manufacture of lighting gas ; this coal is only to be found in the Mons basin ;

2° *Caking or smith coal*, containing 17 to 30 per cent. of volatile matter, suitable for the manufacture of metallurgic coke, for forges, &c. ;

3° *Open burning coal* containing 14 to 17 per cent. of volatile matter, non caking, and suitable for household use, for heating boilers, &c. ;

4° *Close burning coal* or *slow burning coal* with less than 10 per cent. of volatile matter, for household use, for gasogeneous apparatus and calcining furnaces.

In spite of a few anomalies, the law, governing the decrease of volatile matter in proportion to the increase in the depth of the series of layers, is clearly established. It has further been ascertained that, in a given layer, the proportion of volatile matter slightly decreases with the

depth, and that in proportion to the decrease of volatile matter, the caking power also diminishes. Another fact that becomes evident, is that the proportion of volatile matter increases from east to west; for instance no gas coal is to be found at Liege and Charleroy, nor so called close burning coal in the *Couchant* of Mons.

The coal formation crops out at Liege and Charleroy; in the valley of the Meuse it is overlain by a thin layer of modern deposits composed of clay and gravel; from Fontaine-l'Evêque to the west of Charleroy it rapidly dips beneath the barren strata which reaches a thickness of 310 metres in the *Couchant* of Mons; it rises again towards the French frontier. The coal formation is overlain by cretaceous and tertiary layers, clays, sand, marl-sand and flint-chalk. In these layers there are some running beds others are stable but nearly all are fissured and very water bearing, and consequently render the sinking of shafts very difficult. The surface of the coal formation is generally covered by the *Dieves* or thick impervious layers of blue clay in which the cribs for the shaft-tubbings have frequently been fitted; the layers covering the coal formation are sometimes composed of shifting sands or aquiferous grit stones.

The disengagement of fire-damp in Belgian mines is specially noticeable by reason of its abundance and the great violence of its manifestations. The coal produced by mines free from fire-damp only amounts to 14 per cent. of the total output.

Fire-damp exists in all the coal fields, but especially in the folded and irregular formations of the southern district; it is encountered more frequently in the Hainaut basin than in that of Liege; it is moreover in proportion to the depth and the geological age of the layers. From experiments carried out in a few mines in which fire-damp is known to exist, it has been ascertained that the total quantity of gas, normally evolved from the coal, as well as from the blowers and the goafs, amounts from 6 to 35 cubic metres per minute; this quantity is equal to a proportion from 21 to 65 cubic metres per ton of coal extracted. The results of tests made with a manometer in a bore hole, in an unworked seam showed a pressure of 42 atmospheres.

It is to this enormous tension that the phenomena known

by the name of « sudden outbursts of fire-damp » are to be attributed and which generally occur in the Couchant of Mons; at times they occur in the Charleroy basin and in some rare cases in that of Liege. Immense volumes of fire-damp result from these outbursts, which are accompanied by a projection of coal dust, blocking up the gallery behind the face of the workings and often burying the workmen by cutting off their retreat. These sudden outbursts increase more and more with the depth of the workings; 45 of such outbursts have been observed between 1870 and 1880,—106 between 1881 and 1890; 87 between 1891 and 1892. Some of these outbursts have been extremely violent, both with regard to the quantity of fire-damp evolved, as to the quantity of coal projected; the latter has reached 220 cubic metres in a coal seam in which headings were being carried out, and 500 cubic metres in a gallery which was very near meeting a coal seam.

The Campine coal-field. A discovery of the highest importance affecting the future of the country, has been made of a rich and workable coal-field in the provinces of Limburg and Antwerp. Since a long time, it has been supposed that the Westphalian formation extended northwards beyond the Dutch Limburg; before the existence of this coal-field was first demonstrated, two fruitless borings were put down in the valley of the Meuse, one at Lanaeken in 1897, the other at Eelen in 1899. A new boring was carried out at Asch in 1901; on the 2nd August a seam of coal of a thickness of 1 m. 20 was reached at a depth of 520 metres, soon followed by several others. The existence of workable coal seams in the Campine was thus confirmed and the honour of the discovery belongs to Mr. André Dumont, professor at the Catholic University of Louvain, to whose initiative the researches of Eelen and of Asch were due.

This first success gave an impulse to further explorations; within two years and a half 60 other borings, several of which reached a very great depth, have proved the existence of coal formations between the Meuse and Santhoven, near Antwerp. The zone which has been explored is 80 kilometres long and 12 to 16 kilometres wide. The coal formation is overlain by cretaceous and tertiary deposits, except in the north-east, where in addition, thick deposits of red rocks have been found,

which are ascribed to the dyassic or triassic formations.

The depth of the overlaying deposits increases from east to west and from south to north; the minimum depth is to be found at the boring of Stockheim in the valley of the Meuse, where the coal measures were struck at 373 metres beneath the surface, and the maximum depth is at the Vlimmeren borings in the province of Antwerp (896 m.) and at those of Helchteren in Limburg (887 m.) of which 174 metres are composed of permo-triassic formations. The deepest boring reaches 1244, metres in which are comprised 469 metres of coal measures; several are from 900 to 1000 metres deep and have penetrated through coal formations measuring from 300 to 400 metres.

The number and thickness of the seams discovered are very variable. The boring processes do not furnish a doubtless account on the average thickness of workable coal, especially where the total opening of the seams is rather small, and the coal brought up is mixed with a great amount of ashes. Excluding the very thin seams, it may be stated that most of the seams contain 0 m. 40 to 1 metre of coal; there are nevertheless a certain number of seams from 1 metre to 1 m. 75 thick, the maximum being 2 m. 20. The proportion of workable coal for 100 metres of strata penetrated, varies from 0.5 to 6.5 per cent. The richest boring is situated at Coursel; it has penetrated through 300 metres of coal measures and 16 seams giving a total thickness of 14 m. 10 of coal.

Judging by the cores brought up from the different borings, the coal seams passed through are generally horizontal, with a dip towards the north, which varies from 0° to 35°; only two borings have come across vertical seams. The existence of faults and of fire-damp has also been ascertained.

All these investigations have been followed with the keenest interest by the scientific and industrial world, and have given birth to numerous studies and discussions. Complete sections of the borings have been published in the *Annales des mines de Belgique*; several distinguished geologists have determined the nature of the rocks and fossil remains. The samples of coal proceeding from the borings, — most of them collected by the engineers of the Mining Administration when called to make official reports — have been analyzed after the same method in the labo-

WINDING ENGINE IN THE DISTRICT OF CHARLENOY.

ratory of the *Institut Meurice* at Brussels, in order to supply results which may be compared.

Thanks to these numerous studies, it has been ascertained that the coal-field of the north of Belgium belongs to the middle or westphalian coal formation; it includes all varieties of fuel, from the close to the open-burning coal : the coal containing from 30 to 48 per cent. volatile matter is by far the most abundant; the proportion of volatile matter increases from east to west. It may be asserted that the new coal-field contains a reserve of fuel, sufficient to secure, for many centuries, the present output of Belgium. However, it ought not to be overlooked, that this mineral wealth, is buried at a considerable depth, and that the cretaceous and tertiary deposits beneath which the coal is concealed, contain powerful layers of shifting and aquiferous rocks, which are likely to oppose the greatest difficulty to the sinking of shafts of large diameter.

At present 36 requests for concessions of coal-mines have been entered according to the regulations, for areas varying from 1000 to 6000 hectares; several of these areas are totally or partially covered by competition requests.

COLLIERIES.

Output-Development.

There are 119 coal mines in Belgium, covering a total area of 95,637 hectares, comprising 271 seats of extraction in full working, 13 in course of sinking or preparation and 50 considered as in reserve.

The mines which are not worked cover an area of 45,000 hectares.

Several statistic tables are devoted to the exposé of the Belgian mining system.

The following table A lays stress on the annual fluctuations and the progression in the output of coal :

TYPE OF A BELGIAN MINER.

A. — COAL**Output, Value, Cost price,**

YEAR	OUTPUT	TOTAL VALUE	VALUE PER TON	COST PRICE PER TON
	Metric - Tons.	Frs.	Frs.	Frs.
1893	19,410,519	181,405,867	9.35	9.02
1894	20,534,501	191,292,120	9.32	8.92
1895	20,457,604	193,357,700	9.45	9.05
1896	21,252,370	202,010,093	9.51	8.99
1897	21,492,446	220,672,100	10.26	9.36
1898	22,088,335	242,893,880	11.00	9.95
1899	22,072,668	274,443,900	12.43	10.72
1900	23,462,817	408,469,800	17.41	13.15
1901	22,213,414	338,274,090	15.23	12.90
1902	22,877,470	302,027,860	13.20	11.79
Decennial				
1851-1860	8,085,216	87,547,000	10.70	9.33
1861-1870	11,780,626	128,164,400	10.88	9.83
1871-1880	15,033,215	198,032,100	13.18	11.95
1881-1890	18,325,038	175,948,000	9.60	8.90
1891-1900	21,002,948	236,328,750	11.25	10.00

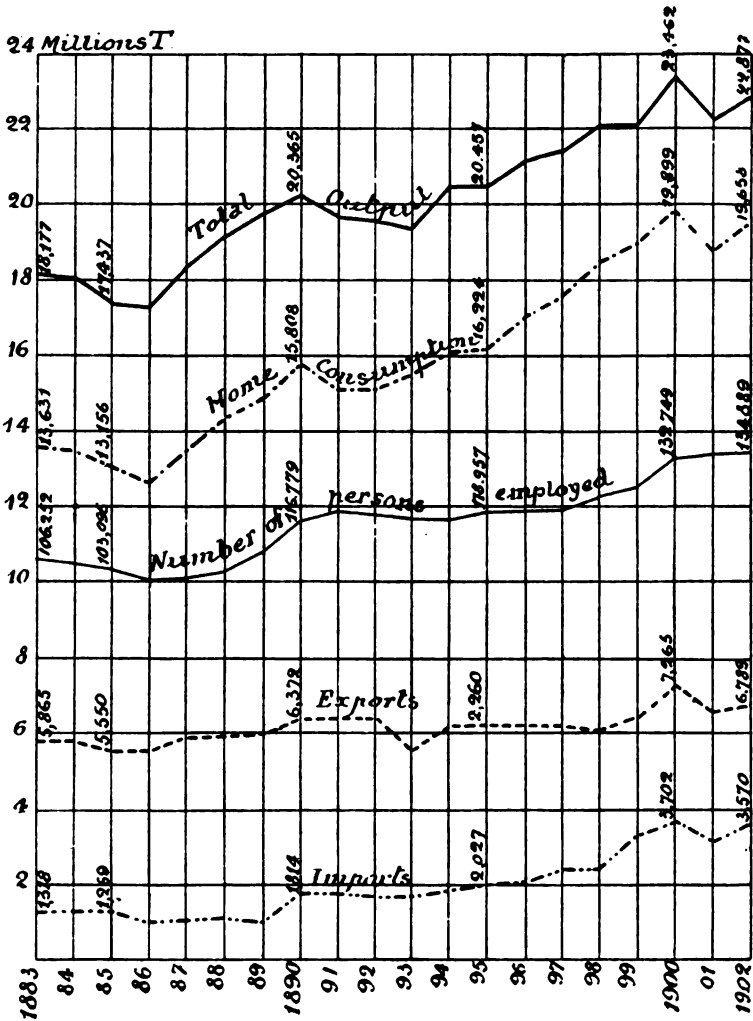
MINES.**Profits, Workmen and Wages.**

PROFIT PER TON Frs.	NUMBER OF WORKMEN	ANNUAL WAGES Frs.	WAGES PER TON Frs.	ANNUAL OUTPUT PER WORKMAN (Underground and above ground) Tons.
0.33	116,861	887	5.34	166
0.40	117,103	941	5.37	175
0.40	118,957	948	5.51	172
0.52	119,246	981	5.50	178
0.90	120,382	1,024	5.69	179
1.05	122,846	1,098	6.10	180
1.71	125,258	1,168	6.62	176
4.26	132,749	1,413	8.00	177
2.33	134,092	1,268	7.65	168
1.41	134,889	1,197	7.06	170

Averages.

1.37	66,429	671	5.51	123
1.05	85,407	792	5.75	138
1.23	103,096	1,013	6.95	146
0.70	104,964	918	5.26	175
1.25	121,096	1,055	6.09	173

Diagram shewing the annual Output of Coal, the exports and imports and the number of persons employed from 1883 to 1902.



With the exception of a momentary regression in the value of the output and the rate of wages from 1881 to 1890, at which period a severe industrial crisis set in in our country, a constant progression may be noticed of all the figures of table *A*. The maximum was reached in 1900. When comparing the results of the working of the collieries with those of 1830-1840, a general increase is noticed, in the output, at the rate of 1 to 7,—in the total value, at the rate of 1 to 10,—in the number of hands, at the rate of 1 to 3.5, whilst the wages have doubled.

Table *B* shows the distribution of the output and of the working staff for 1902, as well as other data concerning the special conditions of work in the various mining districts :—

district in the year 1902.

N A U T		NAMUR	LIEGE	THE KINGDOM
CHARLEROY	TOTAL			
36	67	11	41	119
87	183	15	73	271
30,956	70,156	2,573	25,871	98,600
13,608	26,653	1,061	8,575	36,289
44,564	96,809	3,634	34,446	134,889
7,706	17,777	650	5,542	23,969
7,876,300	15,886,970	754,040	6,236,460	22,877,470
108,112,050	211,698,950	8,513,850	81,815,060	302,027,860
13.73	13.33	11.29	13.12	13.20
55,884,350	115,041,510	4,657,650	41,704,250	161,403,410
39,080,500	75,665,540	3,552,500	29,072,960	108,291,000
94,964,850	190,707,050	8,210,150	70,777,210	269,694,410
12.06	12.00	10.89	11.36	11.79
0.74	0.67	0.85	0.70	0.68
1.022	894	1.160	1.125	954
254	226	293	241	232
177	164	207	181	170
9.50	8.65	11.50	9.30	8.90
4.75	4.37	4.86	4.37	4.39
3.04	2.95	3.02	2.87	2.93
4.23	3.98	4.32	3.98	3.99
5.37	4.98	5.29	5.12	5.02

The stationary steam motors used in coal-mines are classified as follows, according to their principal uses.

STEAM ENGINES — USES	HAINAUT		NAMUR		LIEGE		THE KINGDOM	
	NUMBER	HORSE POWER	NUMBER	HORSE POWER	NUMBER	HORSE POWER	NUMBER	HORSE POWER
Winding . . .	273	64,579	13	1,686	120	16,892	406	83,157
Pumping . . .	155	19,921	13	1,302	120	15,322	288	36,545
Ventilation . .	278	20,060	9	575	108	3,999	395	24,634
Different uses	1,179	24,378	40	998	450	9,713	1,669	35,089
Total. . .	1,885	128,938	75	4,561	798	45,926	2,758	179,425

These motors were fed by 2301 generators measuring 175,790 square metres heating surface. The quantity of coal consumed for the service of the working of the collieries amounts to about 10 per cent of the total output.

According to the quality of the coal, the total output is distributed as follows :—

Gas and cannel coal . . .	13.5 per cent.
Caking coal	18.5 " "
Household coal.	47 " "
Close burning coal . . .	21 " "

Formerly the proportion of close burning coal was less important ; it has greatly increased since the introduction of American stoves and the utilization of coal dust for the manufacture of patent fuel.

The latter industry and that of coke occupy about 4000 hands. The output is entered in the tables *D* and *E*, which also show the total consumption of mineral fuel in

SURFACE WORK AT THE PIT MOUTH.

the country, and the figures of exchange with the neighbouring countries.

C

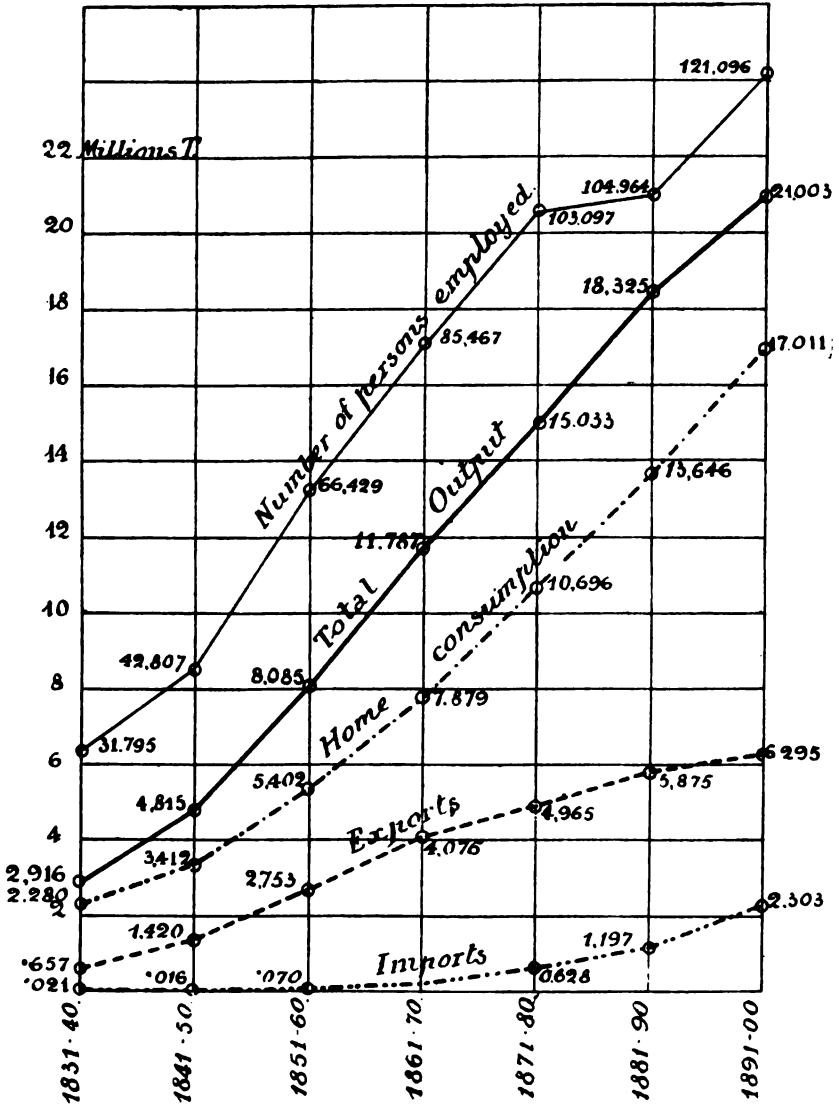
YEARS	OUTPUT OF COKE IN TONS OF 1000 KIL.	OUTPUT OF BRIQUETTES IN TONS OF 1000 KIL.	CONSUMPTION OF COAL, COKE AND BRIQUETTES IN TONS OF 1000 KIL.
	(tons)	(tons)	(tons)
1892	1,832,075	1,146,480	15,128,189
1893	1,683,702	1,216,265	14,524,024
1894	1,716,622	1,326,226	16,107,249
1895	1,749,109	1,217,795	16,224,511
1896	2,004,430	1,213,760	17,063,353
1897	2,207,840	1,245,114	17,637,670
1898	2,161,162	1,351,884	18,451,907
1899	2,304,607	1,276,050	19,001,676
1900	2,434,678	1,395,910	19,899,427
1901	1,847,780	1,587,800	20,018,286
1902	2,048,070	1,616,520	20,751,520

D

COMMERCIAL MOVEMENT OF COAL, BRIQUETTES AND COKE.

YEAR	QUANTITIES (TONS)				OUTPUT
	IMPORTS				
	COAL	BRIQUETTES	COKE	TOGETHER	
1898	2,202,517	1,756	280,590	2,449,798	22,088,335
1899	2,814,274	10,725	296,508	3,344,111	22,072,068
1900	3,288,510	21,813	289,673	3,702,251	23,462,817
1901	2,930,874	17,160	154,247	3,153,953	22,213,410
1902	3,232,510	33,235	230,612	3,570,378	22,877,470
	EXPORTS				CONSUMPTION
1898	4,579,955	666,265	878,435	6,086,226	18,451,907
1899	4,568,938	525,625	1,008,740	6,414,503	19,001,676
1900	5,260,991	604,864	1,073,313	7,265,641	19,899,427
1901	4,820,000	714,445	829,421	6,586,025	20,018,286
1902	5,078,278	671,700	824,256	6,789,693	20,751,520

Diagram showing the average decennial Output of Coal, the exports and imports and the number of persons employed from 1831 to 1900.



The home consumption is ever increasing; it reaches 2.8 tons per head of the population; this last figure is a proof of the great industrial activity of the country.

The greater part of the exported coal is sent to France and to Holland. The remainder is exported to Alsace-Lorraine, Switzerland and Italy. The importations are made for the greater part from Germany (nearly $\frac{2}{3}$); the remainder proceeds in equal quantities from England and France.

Methods of working and managing.

The coal industry is carried on in Belgium under many difficulties and it is only at the cost of unceasing endeavours both on technical and commercial ground, that it succeeds in maintaining its relatively flourishing position.

The neighbouring coal fields, more favoured as regards the richness of the seams, of more recent development and better equipped, carry on a formidable competition, not only on the export trade but even in certain inland districts to which access is not restricted by any fiscal prohibition. The difference therefore between the cost of production and the sale price is much lower in Belgium than in the other mining countries.

Nearly nine centuries ago coal mining was commenced upon the out-crops and some hills by adit-levels; but it was not until steam engines allowed to reach the deeper parts of the coal measures that the yield rapidly increased. The thickness and the nature of the overlaying deposits obstructed, for a long time, the sinking of shafts in the west part of Hainaut, and for this reason coal mines have been more particularly developed in the southern part of the *Couchant de Mons*: the development of those of the comble Nord being of more recent date. In the Centre, on the other hand, the regular flat seams of the northern district were worked as soon as the progress of the science of mining made it possible to penetrate the overlaying deposits.

It will not be out of place to recall here that it is to a Belgian engineer, Mr. Chaudron; that we are indebted for the solution of the problem of the sinking of large diameter shafts by the process generally known by the name of *Kind Chaudron* or full level system. The process was

first applied with complete success at Peronnes and Saint-Vaast from 1855 to 1861, and was adopted in all mining countries. Among the more recent instances ought to be mentioned, as specially interesting, the sinking of the shafts of the Ghlin colliery and of those of *Quesnoy* of the Bois-du-Luc colliery : the former were commenced in 1873 and finished in 1886; they had to be sunk a depth of 324 metres, the coal formation was reached at the depth of 307 metres, overlain by 14 m. 50 of quick sands, the natural water level being at the surface.

The penetration of the quick sands was a matter of the greatest difficulty, and was only rendered possible by reducing the diameter of the shaft from 4 metres to 3 m. 65. This sinking has cost, on an average, 6365 francs per metre.

In 1899, the process was greatly improved at Bois-du-Luc; thanks to this improvement, it was possible to finish in less than two years the sinking and tubbing of two shafts with a diameter of 410 metres to a depth of 245 metres; the water level was 38 metres below the surface.

The compressed air and freezing processes have also received various applications. The latter was only in its infancy when it was employed in 1887, in the Houssu colliery for penetrating 61 m. 70 of shifting rocks; in 1898, it was applied in the Bernissart colliery at the depth of 240 metres, the greatest depth ever reached by the freezing process until now.

When the coal measures are reached, in order to accelerate the work, processes are often adopted which permit the shafts to be lined without interfering with the sinking.

The shafts mostly have a circular section and receive a facing of brick masonry; of late, concrete and metallic or mixed lining has also been employed.

A colliery always comprises at least two shafts, the one used as downcast, the other as upcast. In the more important mines, both shafts are used as winding shafts; in the concessions worked by several pits, diagonal ventilation is often resorted to. Main cross cuts start from the shafts, the vertical distance between the landings being 50 to 80 metres. The working is carried out as a rule simultaneously in several seams and on both sides of the main cross cut; by this method each seam is provided with a

separate air-current always circulating in an ascending direction, this scheme of ventilation being necessary owing to the large amount of fire-damp contained in these deposits.

The only method of working generally used is that of continuous headings with complete gobbing which are pushed forward from the shaft towards the limits of the field.

The pillar and stall system have occasionnally been applied in some thick seams in the districts of the *Centre* and of *Liege*.

The steeply inclined seams are worked in reverse steps, the flat seams either by rising or forward stalls. The disposition of the face in descending steps is followed in certain mines which are subject to sudden outbursts of fire-damp.

Coal cutting is nearly always performed by hand, it is preceded by holing in the unproductive beds of the seam, which is skillfully accomplished by the Belgian hewer. Blasting in coal is restricted to mines containing little or no fire-damp; it is specially used in the hard seams of close burning coal of Charleroy. The consumption of explosives for the getting of coal in these seams varies from 20 to 48 kg. per 100 tons. In the mines where the use of explosives is allowed the average consumption of explosives does not exceed 14 kg. per 100 tons.

Compressed air is specially applied to drilling machines drums and small fans. Haulage is mostly done by horses; mechanical conveyance is reserved to the main roads and is less developed than in other coal-fields where the output is greater and more concentrated. Locomotives are preferred in Belgium to the endless rope or chain systems. Of late it has been found profitable to use benzine motors. Steam is only employed inside the mines, for the pumping engines; the boilers are always placed at the surface.

Electricity tends to replace other modes of transmission of power. On account, of the facility with which it can be adapted to the sinuosities and irregularities of the galleries and of the few cumbersome installations it needs. The underground applications of electricity, to the perforation of rocks, lighting, and especially pumping, winding and haulage are already numerous; they are hitherto confined to downcast shafts and intake air-ways, except in

non fiery mines. In most cases continuous currents with moderate voltage are resorted to. Two important installations make use of the triphase current. In the colliery of Amercœur at Jumet, the underground haulage is performed by accumulator locomotives.

In the present state of the workings, three circumstances specially exercise a preponderating influence on the cost of production and characterise the Belgian mines, viz : the thinness and the contortion of the seams, the disengagement of fire-damp, the great depth of the works.

The average thickness of the workable seams is only 0 m. 68, and as an inferior limit 0 m. 27; in several collieries of the province of Hainaut the average available thickness of all the seams is from 0 m. 40 to 0 m. 50. Hence the considerable importance of the preparatory and of the unproductive works, such as the ripping of roof or floor, conveyance and extraction of the rubbish that cannot be packed underground and must be disposed to waste heaps on the surface, hence also the difficulty, not to say the impossibility, of coal cutting by machinery. Therefore the number of hewers is only one fourth of all underground workmen, and the daily output of the former often does not exceed 2 tons; on an average it has been 3.2 tons during the latter years.

The rocks enclosing the coal exercise as a rule somewhat strong pressures and require solid propping. This may be inferred from the expenditure for timber which amounts to fr. 1.08 per ton raised in the whole of the Belgian mines.

The difficulties are still increased as most of the seams contain fire-damp and large quantities of coal dust, and consequently, on one hand, large galleries have to be opened in order to secure a powerful ventilation of the workings, and, on the other hand, we are compelled to suppress the use of explosives which constitutes, as is well known, the most fearful cause of inflammation of fire-damp. The police regulations of mines are particularly strict in this respect : they prohibit the use of explosives in all fiery mines for the getting of coal and for the cutting of the return air-ways; and in all fiery mines of the more dangerous class (2nd and 3rd category) explosives are prohibited for the ripping of rocks in all ways which are not supplied with a strong current of fresh air coming directly from the downcast shaft.

In the seams subject to sudden outbursts of fire-damp the use of explosives is entirely forbidden. Therefore the driving of the galleries must be performed in most cases with mechanical implements. The mechanical wedges with the aid of compressed air (bosseyeuses), or with Thomas apparatus (rock-crushers) are commonly used and render satisfactory services. Unfortunately these processes are up to the present less powerful, slower and more expensive than the explosives.

In the case of hard rocks, to avoid the dangers of inflammation of fire-damp, safety explosives are employed. The progress accomplished in this direction has been very notable within the last few years. The statistics drawn up by the Office of accidents in mines and of fire-damp, show that the quantity of explosives consumed for all uses in the coal-mines, amounted to 51 kg., in 1893, per 1000 tons of coal raised; out of these 40 consisted of blasting powder, 6 of dynamite, and 5 of safety explosives; in 1901, the total consumption was 48 kg. out of which only 20 consisted of blasting powder, 17 of dynamite and 11 of safety explosives. The decrease of the total consumption and specially of blasting powder and other dangerous explosives has only taken place in fiery mines. In non fiery mines 84 kg. of explosives are consumed per 1000 tons, whereof 73 consist of slow burning powders; in the most dangerous fire-damp mines (2nd and 3rd category), 18 kg. of explosives are consumed, of which $\frac{2}{3}$ are safety explosives.

As the working conditions, owing to the same nature of the deposits are only slightly different, the comparison of these figures shows clearly that the increase of security is acquired in fire-damp mines at the expense of economy. The actual tendency is, in consequence, to improve the manufacture of explosives with a view of increasing their useful effect and their degree of security; the first results obtained by the experiments carried out at the testing station of the Administration of Mines at Frameries, give rise to the hope that new progress is soon to be realized in this line.

Electricity is almost exclusively used in fiery mines for shot firing; the same process is extensively used in the other mines.

On the matter of working at great depth there are to be

noticed the difficulties in winding and ventilating the coal faces.

There are in Belgium :—

120	winding	shafts of less than 400 metres.
102	»	» from 400 to 600 »
67	»	» 600 » 800 »
29	»	» above 800 metres.

The deepest mines are in the *Couchant* of Mons, the shaft No. 10 of the Agrappe colliery is 1050 metres deep, and No. 18 of the *Produits* colliery, 1150 metres; in the Charleroy coal field, the St. Andrew shafts of the Poirier colliery 940 metres, No. 1 of the Marchienne colliery 1025 metres, No. 11 of the Marchienne-Nord colliery 986 metres.

The average value of the geothermic degree is 32 m. 30; it increases with the depth. The temperature of the rocks at a depth of 1000 metres is 48° centigrade, but by means of powerful ventilation that of the air at the coal face is only from 25 to 36° centigrade. To obtain this result, powerful ventilation is required and volumes of air of 100 to 150 litres per second and per pitman or of 7 to 10 metres cubes per 100 tons of coal raised. The pressure of the rocks seems to increase with the depth specially in the Borinage; the number of men employed in keeping up the roads and the costs of repair increase in certain collieries up to three times the general average.

Winding is generally done by flat ropes made of aloes which wind up on reels; wire ropes are hardly used except in the coal field of Charleroy; most of them are flat ropes. The motor-engines are all worked by steam with variable expansion either at the engine driver's will, or by regulator. Two winding engines worked by electricity are now being fitted, the first at the Grand Hornu colliery (*Couchant* of Mons), the second at the Esperance and Bonne-Fortune colliery at Montegnée (Liege). The cost of winding increases rapidly with the depth on account of the consumption of fuel, of the sinking fund to pay for the ropes and the keeping up of the pits and of the plants.

The average daily output per shaft is 270 tons, it does not exceed 600 tons; this is owing to the state of the installations and the nature of the deposits which do not allow a great development of the fields of working.

Most of the collieries were established at a time when

the present development of the coal-mining industry could not be foreseen, the winding shafts are rather narrow when compared with the more modern installations, and the cages carry, as a rule, only one tub on each deck. In consequence of the deepening of the works and the concentration of the winding in the least number possible of shafts, cages of six and eight decks have often been constructed; at Marchiennes the cages have even 12 decks. To accelerate the changing which with such a disposal takes up much time, diversified means have been applied such as hydraulic rams which render the lowering of the cages at the bottom independent of those at the bank.

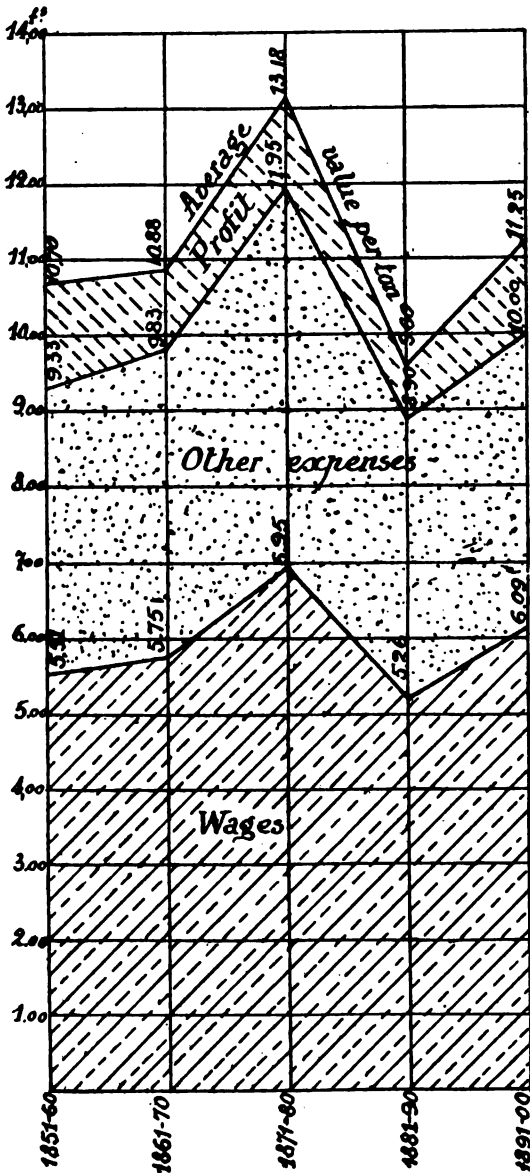
The guides are made of wood or steel. It is in the Mariemont colliery that the first rail guides were established by Briart; they are much used now. In Belgium preference is given to the system of heavy rails supported by sleepers placed rather far apart; this system is preferable for heavy loads and great speed, and requires a minimum of repairs.

Ventilation has, during the last half century, been the object of constant consideration from the managing engineers and the Administration of Mines. The following figures fully show the progress realized in the ventilating engines.

	NUMBER OF MOTORS	TOTAL HORSE POWER	NUMBER OF H. P.	
			per 10,000 pitmen	per million tons raised
1850	78	777	215	133
1860	218	3,354	559	349
1880	385	14,183	1,828	841
1902	395	24,634	2,500	1,105

Though the number of fans has hardly increased within twenty years, the power of these apparatus has augmented by 75 per cent. If the development of the output and of the number of workmen is taken into account, the increase is still 40 per cent. This clearly shows the endeavours which have been made to render the works more healthy by supplying sufficient volumes of air, in spite of the more and more difficult conditions which

Diagram shewing the average decennial value per ton of Coal, the cost in wages and other expenses and the profit, from 1850 to 1900.



result from the deepening and the concentration of the works. Belgian mines have as a rule small equivalent orifices, and high water gauges are required. The ventilators mostly used are of the Guibal type, the mechanical efficiency of which is very good, providing their dimensions are made to correspond with the orifice of the mines, next come the Rabeau, Mortier, Capell, &c., fares.

To prevent the sudden outbursts of fire-damp, the measures which have given the best result consist in limiting the daily advance of the wall-faces and in keeping bore holes in advance. In the management of the works and the air ways, special endeavours are made to reduce to a minimum the consequences of those sudden outbursts; in fact the proportion of mortal accidents is only $\frac{1}{3}$ of the total number of sudden outbursts of fire-damp reported by the Administration of Mines.

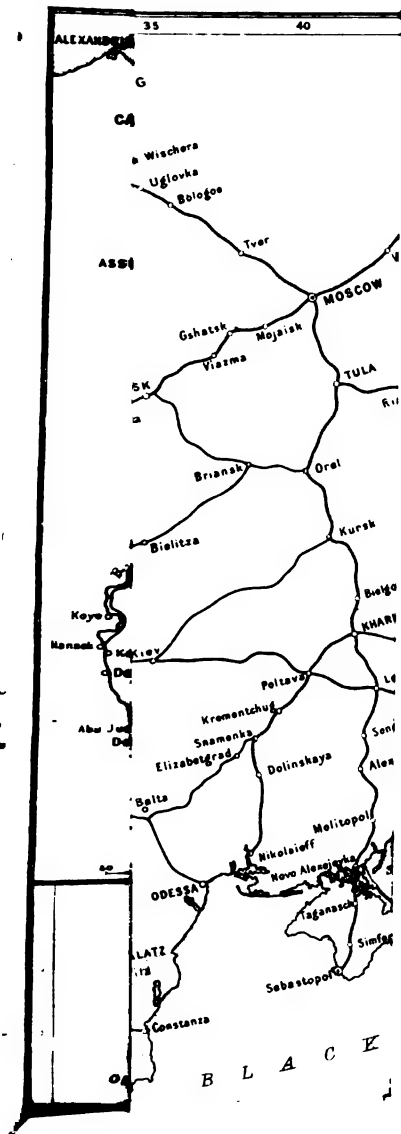
For the lighting of the mines, Mueseler lamps, fed with vegetable oil, are used; of late years portable electric lamps, of Sussmann's system, have been introduced for trial, as well as the Wolf benzine lamps with internal relighting apparatus.

The mechanical coal sorting and washing have since long found an extended field, and the classification of the products for sale has been carried very far.

The working staff is composed as follows :—

Under ground workers	{	males {	ages above 16 . .	91,651
			ages below 16 . .	6,865
		females	ages above 21 . .	84
				<hr/> 98,600
Above ground workers	{	males {	ages above 16 . .	25,659
			ages below 16 . .	2,878
	{	females {	ages above 16 . .	5,143
			ages below 16 . .	2,609
				<hr/> 36,289

The law of 1889 fixes the age of 12 for admission to labour in the case of children of both sexes; it prohibits the employment of women below 21 in the under ground works. This last regulation was not applicable to girls and women employed previously to January 1st 1892, who numbered about 3000. In 1899, under age females had disappeared from the inside of the mines and the number



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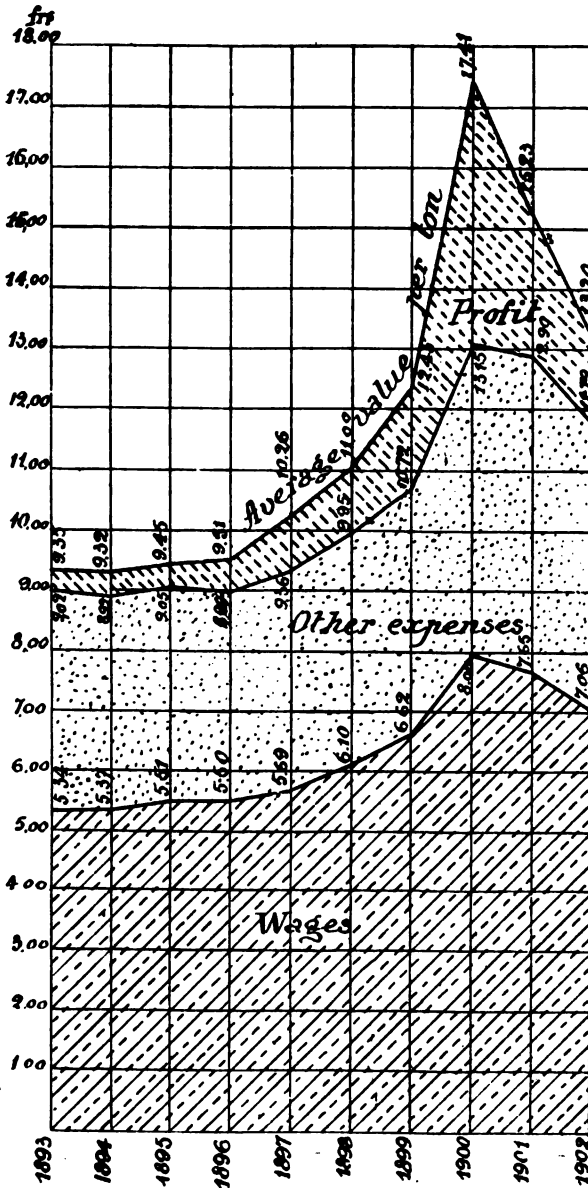
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Diagram shewing the average value per ton of Coal, the cost in wages and other expenses and the profit, from 1893 to 1902.



of females of age had fallen to 289 and it gradually decreases every year. A considerable number of young boys are employed in packing the rubbish and in assisting timbering and upkeep works, specially in the working of the thin seams of the Hainaut coal fields. The daily duration of work is fixed at 10 1/2 hours for the young workmen, and at 10 hours for night work including the ascent and descent and rests of one hour at least.

With regard to above ground labour, night work is prohibited for workmen protected by law; day work is not to exceed 10 1/2 hours including 1 1/2 hour's rest.

The rate of nominal wages is below that of the German and French miners, but one has to take into consideration, that in Belgium, the power of purchase of the same sum of money is notably greater than in the neighbouring countries. In the *Borinage* the wages are the lowest in consequence of the absence of every other kind of competing industry; it is also in this region that the output per workman is the least.

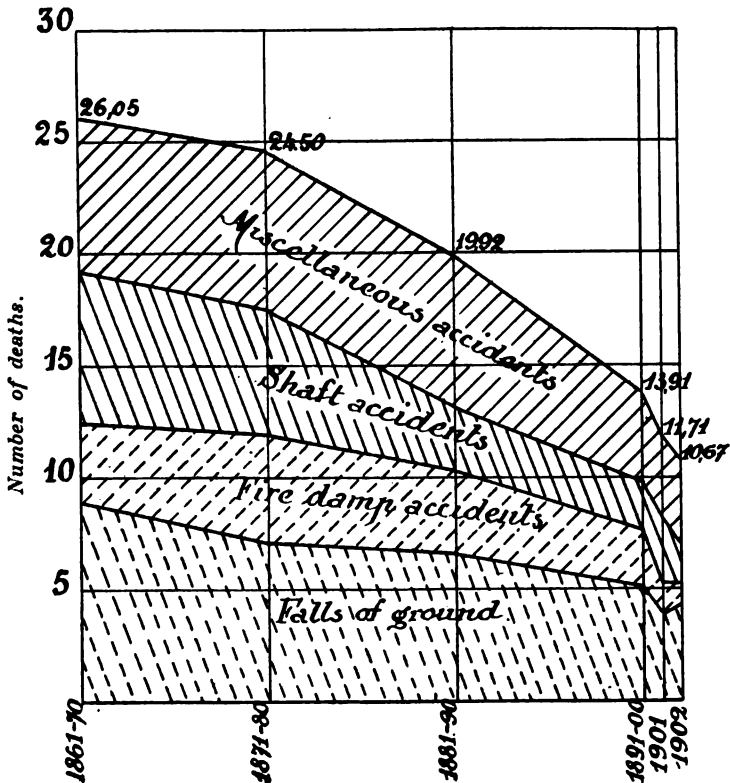
The fluctuations of the wages follow those of the sale price, they are nevertheless less marked than the latter.

This notice will be concluded by a sketch of the results obtained with regard to security in the Belgian coal-mines. In spite of numerous dangers, the professional risk of the miners is constantly on the decrease, as is shown by the statistics of accidents, from which we draw the following table.

DEATH RATE FROM ACCIDENTS PER 10,000 PERSONS EMPLOYED

	1861 to 1870	1871 to 1880	1881 to 1890	1891 to 1900	1901	1902
By fall of stones.	8.98	7.08	6.61	5.10	3.81	4.30
By fire-damp	3.44	4.87	3.64	2.55	1.49	0.90
In the shafts.	6.76	5.56	2.87	2.14	2.77	1.71
Miscellaneous.	6.87	6.99	6.80	4.12	3.64	3.76
Total. . .	26.05	24.50	19.92	13.91	11.71	10.67

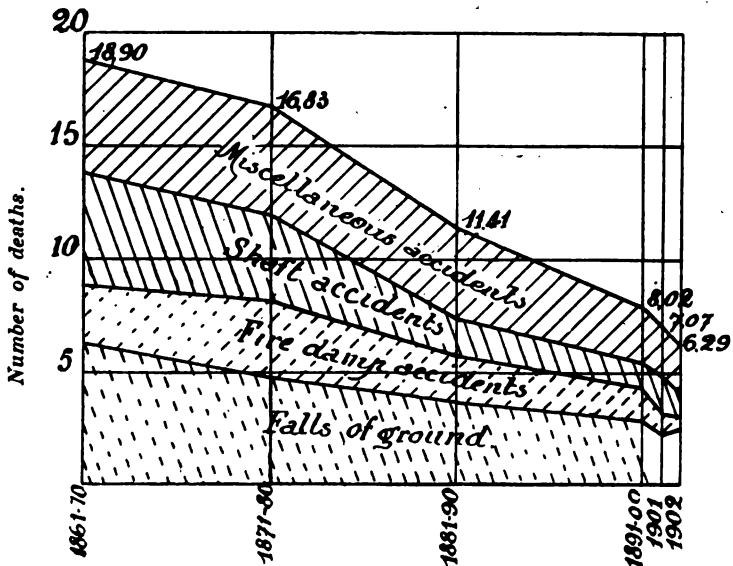
Diagram shewing the death-rates from accidents per 10,000 persons employed below and above ground in Coal Mines.



DEATH RATE FROM ACCIDENTS PER MILLION TONS RAISED.

	1861 to 1870	1871 to 1880	1881 to 1890	1891 to 1900	1901	1902
By fall of stones . . .	6.44	4.86	3.79	2.90	2.29	2.58
By fire-damp	2.49	3.35	2.08	1.47	0.90	0.50
In the shafts.	4.95	3.81	1.64	1.24	1.71	1.00
Miscellaneous.	5.02	4.80	3.90	2.41	2.17	2.21
Total. . .	18.90	16.82	11.41	8.02	7.07	6.29

*Diagram shewing the death-rates from accidents
per 1,000,000 tons raised in Coal Mines*



This constant improvement is the result of the combined efforts of the mine-owners, the workmen and the Administration of Mines; it is due, to a great extent, to the diffusion of technical and professional education, to the keeping in force of the police regulations of 1884, and to the administrative organisation of the scientific study of accidents.

As to salubrity, the Belgian mines are also undoubtedly in a much better situation than formerly. Nevertheless since 1896 the miners' disease called ankylostomiasis makes great havoc in several mines and especially in the Liege coal field. An inquest ordered by the Government in 1900 has revealed, that in this coal field, about 30 per cent. of the workmen were infested with the worm. The mine-owners and provincial authorities have organized the struggle against this endemic disease, by several prophylactic measures and by the medical treatment of the affected workmen. The International Congress of hygiene which took place in Brussels, in September 1903, examined this question and it is to be hoped that the general application of the measures recognized as the most efficacious will vanquish this new enemy of the miner.

Metalliferous mines.

In opposition to the coal mining industry, the metalliferous mining is on the decline. Twenty years ago this industry occupied 10,000 persons and the output of ores (especially calamine and oligist iron ore) amounted to 14 million francs. The lodes are now exhausted or industrially unworkable.

METALLIFEROUS MINES.

YEARS	WASHED IRON ORE		LEAD ORE		ZINC ORE	
	Tons	Value	Tons	Value	Tons	Value
1893	284,465	1,477,900	67	7,600	11,310	635,800
1894	311,222	1,582,200	160	16,900	11,585	578,500
1895	312,637	1,480,450	220	25,500	12,230	564,250
1896	307,031	1,417,820	70	8,050	11,630	601,250
1897	240,774	1,264,510	108	16,150	10,954	578,050
1898	217,370	1,058,220	133	11,475	11,475	747,560
1899	201,445	1,073,100	137	32,700	9,460	855,400
1900	247,890	1,320,100	230	63,280	8,715	556,330
1901	218,780	1,112,900	220	42,065	6,645	273,325
1902	166,480	679,700	164	12,850	3,852	190,520

YEARS	IRON PYRITES		MANGANESE ORE	
	Tons	Value	Tons	Value
1893	6,301	49,000	16,820	200,500
1894	3,150	29,900	22,048	277,700
1895	3,010	36,150	22,478	286,270
1896	2,560	26,850	23,265	345,020
1897	1,828	19,950	28,372	342,700
1898	147	886	16,440	211,500
1899	283	1,900	12,120	156,800
1900	400	1,140	10,820	130,350
1901	560	1,960	8,510	110,800
1902	710	3,200	14,440	187,300

VALUE OF THE TOTAL OUTPUT AND NUMBER OF WORKMEN.

YEARS	AGGREGATE VALUE	NUMBER OF WORKMEN	YEARS	AGGREGATE VALUE	NUMBER OF WORKMEN
1893	2,379,800	1,804	1898	2,039,670	1,679
1894	2,485,200	1,581	1899	2,199,900	1,493
1895	2,392,620	2,201	1900	2,071,200	1,437
1896	2,398,900	2,017	1901	1,541,050	1,196
1897	2,221,360	1,934	1902	1,073,570	860

BLAST FURNACE IN THE LIÈGE DISTRICT.

Metallurgy.

The principal metallurgic centres of the country are situated in the districts of Charleroy and Liège : the development of metallurgy having been specially favoured in these districts by the different varieties of fuel which are found in these basins, and by the numerous ways of communication which furrow the country.

Another less important metallurgic center exists in the neighbourhood of the beds of iron ore, in the south of Luxemburg.

The following table shows the quantities of metals produced in Belgium during the last decennial period :—

METALLURGY.

YEARS	CAST IRON		IRON AND STEEL	
	Tons	Value	Tons	Value
1893	743,264	36,052,500	709,943	90,741,400
1894	818,597	40,828,100	794,608	97,789,800
1895	829,234	40,208,900	813,816	98,148,460
1896	939,414	51,580,900	1,013,343	127,133,844
1897	1,035,037	60,720,380	1,002,436	134,223,708
1898	979,755	57,904,850	1,052,768	142,593,050
1899	1,024,576	74,403,950	1,109,148	172,590,800
1900	1,018,561	91,546,150	936,702	175,925,560
1901	764,180	47,254,100	1,400,400	181,058,940
1902	1,069,050	62,962,400	1,893,930	218,250,780

YEARS	ZINC IN INGOTS		LEAD CRUDE	
	Tons	Value	Tons	Value
1893	95,665	39,602,100	12,006	3,075,600
1894	97,041	36,166,806	14,120	3,523,100
1895	107,664	38,496,700	15,573	4,203,800
1896	113,361	45,912,200	17,222	5,149,900
1897	116,067	49,680,450	17,023	5,508,800
1898	119,671	59,409,300	19,330	6,262,100
1899	122,843	74,628,850	15,727	5,930,966
1900	119,317	59,631,150	16,365	6,978,000
1901	127,170	53,378,150	61,900	19,351,800
1902	124,780	56,675,000	73,357	20,680,100

YEARS	SILVER	
	Kilogr.	Value
1893	26,717	3,455,400
1894	28,961	3,026,100
1895	31,543	3,430,000
1896	28,509	3,189,500
1897	30,073	3,157,109
1898	116,035	12,385,850
1899	134,854	15,380,600
1900	146,548	18,041,000
1901	169,450	19,735,300
1902	212,922	20,990,850

Blast furnaces.

There are 40 blast furnaces in Belgium, 33 of which were in blast in 1902 and turned out 1,069,050 tons of cast iron, whereof 50 per cent Thomas pig and 25 per cent forge pig. Belgian ores supply 6 per cent. of the total consumption, the remainder comes from abroad, namely Luxembourg and Spain.

The blast furnace industry occupies more than 3000 hands.

Steel-Works.

There are 19 steel works containing 19 steel furnaces and 46 Bessemer converters; these works produced in 1902 769,000 tons of steel ingots and 17,940 tons of castings.

The transformation of iron works into steel works increases from year to year; however the puddling-furnaces are not likely to disappear before some time, because small sections are still in great demand, especially by the foreign clients.

It may also be stated that more than 96 per cent of the output of Belgian steel pig has been absorbed by the manufacture of steel.

Moreover 558,510 tons of products of refined steel such as special sections, rails, girders, sheets, &c., have been manufactured in these steel works.

Iron Works and Wrought Steel Works.

The output of the iron works for 1902 reached 381,630 tons of shaped iron consisting in merchant iron of different sections cast or rolled, thick or thin sheets.

On the other hand in these works as well as in the steel works, the raw steel products have been transformed into finished articles at the rate of 166,810 tons, which carries the total output of finished steel to 725,820 tons.

OUTPUT IN TONS AND AGGREGATE VALUE OF PIG IRON AND STEEL.

	1901	1902
Pig Foundry	86,170	104,540
Aggregate value	4,653,400	5,761,300
Forge pig	178,250	254,710
Aggregate value	9,315,420	13,589,000
Castings for Bessemer steel	166,820	199,170
Aggregate value	11,377,350	12,219,500
Castings for Thomas steel	322,940	510,630
Aggregate value	21,907,930	31,392,600

OUTPUT IN TONS AND AGGREGATE VALUE OF IRON-WARE.

	1901	1902
Bar crude	349,380	200,290
Aggregate value	34,570,100	33,789,150
Special sections	35,260	36,330
Aggregate value	5,553,550	5,345,500
Splitted and sinuous iron	29,640	21,820
Aggregate value	3,932,600	2,790,500
Thick Sheet iron and flitch girders	41,080	38,030
Aggregate value	6,293,900	5,388,800
Thin Sheet iron	24,680	24,710
Aggregate value	4,674,230	4,339,010
Forged iron.	550	450
Aggregate value	152,500	102,350

OUTPUT IN TONS AND AGGREGATE VALUE OF STEEL-WARE.

	1901	1902
Steel Bars	85,530	120,700
Aggregate value	12,586,330	16,170,250
Special sections	102,290	77,660
Aggregate value	13,701,800	9,879,700
Rails and sleepers	132,260	268,220
Aggregate value	17,000,050	30,876,000
Tires and axles	12,380	12,790
Aggregate value	2,713,850	2,547,150
Girders	48,650	100,390
Aggregate value	6,870,100	13,255,300
Rods and sinuous steel.	20,490	26,890
Aggregate value	2,879,650	3,690,800
Thick sheets	54,110	63,250
Aggregate value	8,776,100	9,307,550
Thin sheets.	30,620	42,640
Aggregate value	6,474,280	8,263,620
Hammered steel	3,310	3,780
Aggregate value	868,250	775,400

Zinc, Lead and Silver Works.

Twelve zinc-works established in the province of Liège and of Limbourg, working almost exclusively foreign ore, have produced 124,780 tons of zinc crude in 1902.

Ten zinc rolling-mills supplied 30,070 tons of finished articles.

Finally four works in the provinces of Liège, Limbourg and Antwerp have produced 73,357 tons of lead and 212,922 kilog. of silver.

COMMERCIAL MOVEMENT OF THE METAL TRADE.

YEARS	CAST IRON	FINISHED IRON WARE	STEEL INGOTS	FINISHED STEEL ARTICLES	ZINC CRUDE	LEAD CRUDE
OUTPUT (TONS)						
1898	979,755	485,040	653,523	567,728	119,671	19,330
1899	1,024,576	475,198	734,249	633,950	122,843	15,727
1900	1,018,561	358,163	655,199	568,539	119,317	16,365
1901	764,180	380,560	515,780	503,700	127,170	61,900
1902	1,069,050	381,630	769,040	743,260	124,780	73,357
IMPORTATION (TONS)						
1898	317,288	19,735	25,142	24,761	17,441	54,767
1899	359,720	44,633	11,666	34,621	11,058	60,649
1900	305,668	44,721	19,705	43,875	11,478	58,141
1901	165,766	65,726	68,229	51,427	13,896	54,719
1902	317,828	46,209	25,142	25,775	17,441	54,867
EXPORTATION (TONS)						
1898	16,249	385,434	1,019	172,262	108,507	40,303
1899	13,501	466,018	1,259	187,009	101,244	41,618
1900	8,252	362,864	974	174,998	99,233	46,566
1901	16,265	387,766	290	199,386	106,656	47,971
1902	16,789	397,707	1,018	209,914	108,507	40,303
HOME CONSUMPTION (TONS)						
1898	1,280,794	119,341	677,646	416,227	28,605	33,894
1899	1,370,801	53,813	741,656	412,320	32,657	34,758
1900	1,315,977	40,020	673,930	437,416	31,562	27,940
1901	913,681	58,520	583,718	355,741	34,410	68,648
1902	1,370,089	30,132	742,880	559,121	33,714	87,921

COMMERCIAL MOVEMENT DURING THE 11 FIRST MONTHS OF 1903
(IN TONS).

	IMPORTS	EXPORTS
Iron ore.	2,800,000	378,000
Pig iron.	309,000	24,000
Foundry goods	5,500	17,000
Scraps	42,000	51,000
Raw cast steel	13,000	1,000
Steel slabs and blooms	81,000	2,000
Steel rollers and plates	34,000	1,000
Steel wire	27,000	8,000
Steel (not specified)	9,000	20,000
Rough forgings (iron)	5,000	1,500
Wire (iron).	3,500	1,500
Sheet-iron	9,000	59,000
Wrought iron.	7,000	46,000
Iron (not specified)	12,000	240,000
Rolling stock	2,000	39,000
Engines.	36,000	26,000
Girders (steel)	—	36,000
Girders (iron).	4,000	20,000
Rails (steel)	2,000	235,000
Sheet steel.	2,000	13,000
Wrought steel	1,600	25,000
Nails (iron and steel)	1,000	16,000

Quarries.

Quarrying is represented in a very complete and very diversified way in Belgium : the value of the output for 1902 is estimated at 56,766,390 francs; this industry employs 36,500 persons.

The blue free-stone (limestone called « little granit ») of which the quantity extracted corresponds to about one fourth of the estimate quoted above, is supplied by two important centres of production, one situated in the province of Liege, the other in the province of Hainaut. Most of these stones are cut and polished at the quarry and are the object of an important export trade.

These workings have taken a considerable expansion and necessitated large capitals and a great number of improved machines. The helicoid wire is chiefly used for the extraction and cutting up of blocks. All these machines are at present worked by electricity.

The next most important industry is the production of lime which is distributed in the southern part of the Kingdom, especially in the provinces of Hainaut, Namur and Liege; this industry principally feeds the home markets. The stones of the Tournaisis quarries are employed in the manufacture of hydraulic lime and quick- or slow-taking cement. Great quantities of these products are also exported.

The principal paving-stone quarries are found in the provinces of Brabant, Liege, Hainaut, Namur and Luxemburg. The most important are those of Quenast and Lessines, working a broad mass of porphyric rock; these quarries supply, in addition to the paving-stones, large quantities of ballast and crushed gravel for various uses, specially the manufacture of concrete.

The quarries of the valley of the Ourthe working devonian sandstone are likewise remarkably extended.

There are also paving-stones made of lime stone and sandstone of various geological formations. All these products are the object of a considerable export trade.

Lime phosphate is worked in the chalk formations of the neighbourhood of Mons and of the Hesbaye, where it is deposited in the shape of nodules or chalk mixed with phosphates; it is enriched on the spot and transformed into superphosphates for agricultural uses. The value of the annual output is about 3 million francs.

We ought also to mention the slates which are principally quarried in the province of Luxemburg and are the object of commercial transactions which amount to 1 1/2 million francs, and the plastic earths which are extracted in the neighbourhood of Namur and in the province of

Hainaut and are used chiefly for the manufacture of gas retorts and zinc crucibles.

YEARS	VALUE OF THE OUTPUT IN FRANCS	NUMBER OF WORKMEN
1893	41,433,000	29,191
1894	38,380,300	28,977
1895	40,973,662	31,801
1896	44,874,200	32,601
1897	49,204,306	32,601
1898	52,799,930	35,625
1899	55,448,745	36,931
1900	56,300,380	37,281
1901	53,874,680	37,260
1902	56,766,390	36,469

Number of quarries worked in 1902, excluding those that quarry tertiary clays and sands : 1732.

WROUGHT IRON, PIG IRON AND STEEL.

Nails and Brads.

Most of the nails produced in Belgium are made by machinery; by hand are only made certain qualities for which there is but a small demand, or those possessing a peculiar shape, for instance the two-pointed nails for shoes, and the large nails used in founderies or for building purposes such as hooks, staples, &c.

Machine made nails include two categories of products:—

1° The nails properly so called, cut out of thin sheets of extra-soft steel or iron No. 3 or 4;

2° The wire-tacks, which are cylindrical nails, made of very soft steel or iron wire No. 2.

Are also made : copper nails to fix the roofing slates of certain works which evolve corrosive gas; brass points with conical heads for fancy boots; others for nailing cases for explosives; bulged nails for harness making, copperplated steel slate hooks, &c.

The nail industry comprises in Belgium 42 small hand-making works and 13 factories working with machines. These establishments situated in the provinces of Hainaut, Namur, Liege, and a few in Brussels, occupy over 1600 workmen and use a motive power of about 1500 H. P. Their annual production reaches 27,000 tons; about 16,300 tons of which are sent abroad.

Screws.

The screw-industry includes, the manufacture of wood screws and of metal screws, which are employed in iron mongery; further of shouldered metal screws, which are real lathe pieces, with much stronger heads and which are made to order.

The ordinary screws of the first category are made of puddled iron rods from No. 00 (15 millimetres in diameter) to numbers 6 and 8.

Shouldered screws are cut from rods, the diameter of which is equal to the screw's head.

The factories having the speciality of shouldering screws (*décolletage*), perform the same operation on many other pieces, threaded or not, of different metals, such as steel or tilled iron pieces for bicycles, brass pieces for telephonic and electric apparatus and for gas fitters. Red copper screws are also made and even nickel and Berlin-silver screws, the latter for musical instruments.

As to the sizes of shouldered screws, all diameters are found up to 64 millimetres.

The screw-factories are 18 in number distributed in the environs of Liege, and Brussels, in Antwerp and in Louvain. They use a motive power of 550 H. P. and occupy 750 persons.

The total production may be valued at about 2600 tons, a good deal of which is exported.

Bolts and Rivets.

The manufacture of bolts, bolt-nuts, rivets, screw-rings, hooks, &c., forms a fairly important industry in Belgium. It is almost entirely concentrated in the province of Hainaut and the environs of Liege. There are 42 bolt-factories which employ 2600 persons with a motive power of 1600 H. P., and produce yearly above 34,000 tons, more than 15,000 of which are exported.

Almost all these products are machine-made; the bolts intended for machine-tools alone are hand-made.

The metal used in this manufacture is fibrous steel or iron No. 4.

The small rivets up to 6 and 8 millimetres are figured cold.

The bolt works also manufacture other pieces of current sale, such as bolt-washers, threaded ends for soldering; supports for insulators, &c.

Chains.

In Belgium the manufacture of chains is generally carried out by hand work.

Two kinds of chains are manufactured :—

1° Iron-mongery chains made of numbers 4 and 5 iron wire and which are manufactured especially at Fontaine-l'Evêque. For these chains several works have adopted the French and American electric-soldering process;

2° The chains for the industry and the navy (chains for waggons, cranes, collieries, ship chains with stays, &c.), the superior qualities of which are made of numbers 4 and 5 fibrous iron or of soft steel. These chains are manufactured with links of different thickness, from 4 millimetres in diameter up to 80 and even 130 millimetres.

Since some time a new process has been adopted for the manufacture of chains *without soldering* : it consists in forming the links by rolling a rod round itself in a special rolling mill.

All chains intended for industrial use are tested before being delivered. They are to resist in the whole of their length to a load of 15 kilog. per square millimetre, without any permanent deformation. A few links are also tested by loading up to breakage; this load must not be less than 25 to 30 kilogrammes according to quality.

There are in Belgium 26 chain factories, most of them situated in the province of Hainaut, some at Liege. They occupy 320 hands and dispose of a motive power of about 100 H. P. The annual output amounts to 3260 tons, 650 tons of which are exported.

Pipes.

In Belgium the manufacture of malleable iron pipes is carried on in 3 establishments occupying together about 400 persons and utilizing a motive power superior to

1300 H. P. The annual output exceeds 4600 tons nearly, half of which is intended for exportation.

There are two kinds of pipes :—

1° Soldered pipes made with iron or steel sheets properly jointed and brazed ;

1° Seamless pipes manufactured by stamping or by a process of oblique rolling. The products manufactured according to the last method undoubtedly offer greater security as far as resisting power is concerned ; they are well adapted namely for supporting considerable interior pressure or for resisting to torsion, such as steam pipes and water pipes under high pressure, pipes for compressed air, hollow shafts for transmissions, recipients for carbonic acid, tubes for motor cars and bicycles axle-boxes, gun tubes, &c.

Among the numerous products of this industry may be mentioned tubes with threaded ends, with brass ends, with collars, galvanized tubes, threaded tie-bars, tubes for boring artesian wells, hollow posts for electric canalizations, &c.

Springs.

Springs are manufactured in Belgium in 5 principal factories.

Springs are classed in three different categories :—

1° Springs made of plates placed one upon the other used as bearing springs and draw springs. These springs are of more or less hard steel, and fitted with grooves and ridges when intended for railway carriages ; those used in the manufacture of carriages are plain ;

2° Conical spiral springs, used as bearing and draw springs and also for wagon buffers ; they are made of cast steel sheets properly twisted ;

3° Spiral metallic springs, made by winding a round, square or flat rod, heated or cold, round a mandril. They are afterwards oil-tempered and heated again. The thickness of these iron springs is very varied ; the diameter of springs used in the manufacture of arms often attains $1\frac{1}{2}$ millimetre.

Annual output of springs : about 4900 tons. Exportation : 2950 tons. Number of persons employed : 342. Motive power : 222 H. P.

Forged and stamped Pieces.

Forged and stamped pieces are manufactured for constructing railway equipment, for making arms, bicycles and also hardware. This industry is carried on in Belgium in about twenty establishments.

The pieces for railway plant are forged especially in the province of Hainaut and stamped in the province of Liege. Let us mention among these : coupling screws and draw rods, hand-rail fittings and footboards for railway carriages, switches and fittings for railroads, fittings for bridges, Saxby apparatus, &c.

Among the pieces manufactured by stamping may be mentioned : rifle and revolver hammers, wrenches, pieces for bicycles, for lathes, pumps and boilers; finally the numerous hardware articles such as pincers, nutcrackers, shears, shoemaker's tools, stirrups, bits, &c.

For small pieces not exceeding 6 millimetres thick, a stamping and chasing press is used similar to that used in the factories of enamelled ware.

Hooks, Pins and Needles.

The articles under this head are manufactured in three factories, two are situated at Anderlecht and the third one at Saint-Nicholas.

The output of these three factories is 264 tons a year. They employ 268 persons and their motive power is valued at 150 H. P.

OLD WELL EXECUTED BY QUINTEN MATSYS,
IN ANTWERP.

The various processes used in the manufacture of hooks, needles and pins are performed automatically by improved machines.

The hooks, pins and needles made of soft steel can be varnished, the brass ones are tinned, sometimes silvered.

Needles are made of cast steel; they are packed up by lots of 25, with special blue paper which prevents oxydation.

Knitting needles and hair-pins belong to the same kind of manufacture.

Saws.

Only ribbon-saws are made in Belgium. The metal used is cast and hardened steel, in polished bands of 10 to 150 millim. broad by 0.2 to 1.5 millim. thick.

There are 5 manufacturers established in Brussels. They occupy a dozen workmen and the importance of their output is about 28,000 metres. The exportation represents nearly one sixth of the latter quantity.

Files.

Files are made of Bessemer steel called *de double fusion* for ordinary qualities, and of crucible steel for superior qualities.

This industry, occupying about 150 persons, is carried on by 16 establishments situated at Liege, Brussels, Ottignies, Ghent, &c., manufacturing all kinds of products : files for engineers, for arm manufacturers, &c., also files for watchmakers, jewellers, &c.

These various kinds of files are classed by different numbers (Switzerland gauge), which correspond each to a different cut, characterized by the depth and the distance of the grooves for the same width.

Thus No. 00 corresponds to the *rough* cut, numbers 0 and 1 to the *bastard* cut, No. 2 *half smooth* cut, No. 3 to the *big smooth* cut, No. 4 to the *smooth* cut, numbers 5, 6, 7, 8 and 9 to the *superfine* cut used for jewellers and watchmaker's files.

The cutting of files is done by hand, except in one factory where machinery is used. The jewellers files are also

made by machinery. As to the hardening of files, certain manufacturers possess special devices which they keep secret.

Beside the file manufacturers there are in the different industrial districts of the country a lot of minor operatives employed only at cutting and hardening files already forged and ground, and recutting old worn out files.

The annual output of new files, finished or not, reaches about 500,000 kilog., nearly 325,000 kilog. of which are exported.

Various Tools.

Under this head are comprised tools used for manual labour such as agricultural and gardening tools, tools employed in mines and quarries; masons, wood-cutters, joiners, carpenters and smith's tools.

This industry includes different kinds of manufactures :—

In the sheet-iron works, articles of good quality are manufactured, of thin sheets obtained by beating thicker sheets. There are in Belgium 9 establishments of the kind, in the provinces of Hainaut, of Namur and of Liege. The sheet-iron works turn out steel spades or only steel edged. mould boards and other parts of ploughs, hoes, weed hooks, scrapers, trowels, scoops, coal shovels, manure buckets, &c.

If the tools are not required to be very strong, they are made by stamping and flanging, such is the case for the common and light articles with large surface, shovels, &c., made out of sheets of rolled steel from 0.4 up to 3 millimetres thick and obtained by 1, 2 or 3 successive flangings. Six factories, out of which 4 are established at Liege, carry on this kind of manufacture.

The *manufacture of edge tools* turns out all kinds of sharp instruments obtained by forging and among which we quote : scythes, sickles, bill hooks, axes, hatchets, tools for working wood, chisels, gouges, dub-adzes, tools for working stone and iron, levers, pincers, wedges, gravers, tongs, sledge-hammers, hammers; finally soldering tools, harness articles, &c.

As for the handles to complete these tools, they are generally manufactured in other factories. They are as

a rule of ash or hikorey, sometimes of cherry or white wood.

There are in Belgium 30 factories of edge tools distributed in the provinces of Liege, Namur, Hainaut, Brabant and East Flanders.

The smith's and carpenter's screws, the clamps brake-screws and other articles of the same kind are entirely hand made. They are the object of a small speciality belonging to the manufacture of tools and carried out by three establishments in the province of Hainaut.

The total output of tools in Belgium, not including the handles, amounts to about 3460 tons, one quarter of which are sold abroad. The number of persons employed in this industry is 376 and the motive power utilised is about 450 H. P.

Cutlery.

The cutlery industry is confined to four important manufacturing centres. At Lierre and Aerschot are turned out the *flemish knives*, rough-staped and used specially in the country. At Gembloux and Namur the superior quality are made comprising different categories of articles; butcher and kitchen knives called *plates semelles*, table knives or *clasp-knives*, pocket and pen-knives. There is also a factory in which surgery instruments are specially manufactured.

There are two kinds of knives, those with fixed blades and those with folding blades.

Fixed blade knives. Generally forged by hand. The rivalry between manufacturers has made the process of cutting out of steel, be adopted. This is the case for articles of second quality and also for kitchen knives, choppers and shoemaking implements.

Generally the Flemish knives and the Gembloux butcher knives have their handles made out of one piece of wood, native wood, beech wood, acacia wood, pear wood, apple wood; or of exotic wood such as palm wood, ebony wood, red Congo wood.

In the flat-soled knives the handles are made of two plates fixed by three small rivets. The raw material used is bullock or buffalo horn or ebony.

The handles of clasp-knives are of one piece and made of ebony, Congo wood, horn and rarely ivory.

Clasp knives. These knives are of two kinds : pocket knives possessing from one to four blades and penknives of smaller size but more carefully made and containing from one to five blades.

The blades and springs of folding knives are hand made. They are fitted between two iron plates in pocket knives, and copper or new silver plates in penknives. These plates are cut out of metallic sheets.

The handles are made of horn (bullock, roe, stag) or wood (box, ebony, iron-wood) for ordinary articles, and walnut, tortoise shell, mother of pearl, bone and ivory for penknives.

Surgical instruments. This speciality requiring careful workmanship, supplies the instruments used in ordinary and veterinary surgery : bistouries, scalpels, lancets, scoops, forceps, sounds, &c. These instruments are fitted with ebony or nickelplated metal handles.

The cutlery industry comprises 42 factories, 12 of which at Aerschot, 11 at Lierre, 12 at Gembloux, 6 at Namur and 1 at Ghent. These establishments utilize a power of 65 H. P. and occupy 260 persons.

The approximate value of the annual output is 260,000 fr. out of which 45,000 francs worth are exported.

WROUGHT METAL INDUSTRIES.

Zinc.

Most of the zinc produced in Belgium is intended for the rolling-mills.

Leaving aside the sheets of zinc used for the glazing of paper, we find, sheet zinc is largely utilized for the protection of roofs and even of walls exposed to rain. The Belgian factories rank amongst the most important in the world for the supply of this class of goods and turn out every kind of zinc required for the purposes of protection in building: plain smooth sheets to be soldered horizontally for use in the case of slight slopes; plain sheets flanged for clasping; corrugated sheets, diamond shaped tiles with clasps of a more decorative style.

Next, come a whole series of accessory and ornamental pieces in wrought zinc, *repoussé* or spun in the lathe or stamped, such as spires, finials, vanes, parts of dormer-windows, crest and ridge-work, tassels, nails, &c.

Rolled zinc has other interesting but less important uses, as for instance: the drawing of thin wires such as used by gardeners, electrodes for electric batteries; discs for treating the gold ores with cyanide of potassium, and the manufacture of various articles such as: letters, baths, &c.

A certain quantity of zinc ingots are sold to the copper foundries for the manufacture of brass.

The total output in milled and wrought zinc amounts to about 39,000 tons yearly, nearly three quarters of which are exported. The motive power required by this industry amounts to 1100 H. P. and 650 persons are employed.

The factories producing rolled zinc amount to 9 and to 5 in the case of wrought zinc, almost all of which are situated in the province of Liege.

Lead and Tin.

Lead in ingots is rolled into sheets and pipes. The latter are manufactured by means of a hydraulic press. Those intended for conveying beer or other acidulated drinks are coated during the manufacturing processes with a covering of tin both inside and out.

The manufacture of pump-barrels either cast in one piece or formed by pipes and joints soldered together, belongs to the same class of industry.

Next in importance to these two branches of the wrought lead industry come two others, possessed of some commercial importance. First may be mentioned the manufacture of shot of all sizes, including hardened lead shot, or lead, shot, prepared with antimony and called *chilled shot*. It may be mentioned that, in order to meet foreign demand, several manufacturers supply shot numbered according to the English gauge.

Another minor industry not without interest is the manufacture of capsules for bottles, made of soft lead faced with tin : these articles for which there is an ever increasing demand are made after the tinning of the ingots, by punching and beating out the rolled lead, usually with the name of the firm stamped thereon; the capsules are afterwards coloured by hand with colours prepared with spirit-varnish.

Pure tin is rarely used except in very thin sheets for packing chocolate, tobacco, cigars, bunches of flowers, and in thicker sheets for covering counters; pipes of pure tin are also manufactured.

The thinnest sheets used for packing, are only $\frac{2}{100}$ millimetres thick, which corresponds to an area of 20 square metres per kilogramme.

When tin is intended to come into contact with food-products, not more than 1 per cent. of impurities is allowed (lead, &c.).

Thirteen establishments situated in Brussels and in the provinces of Liege, Namur, Hainaut, and in the two

Flanders, are employed in the manufacture of wrought tin and lead. Number of workmen : about 150; motive power : 320 H. P. ; approximate yearly output : 11,300 tons, a certain portion of which is exported.

Copper and Brass.

The working of copper and brass is an important branch of the Belgian industrial production and greatly contributes to feed its export trade.

The applications of both these metals to arts and industry are indeed very numerous.

First may be mentioned the rolling of thin and thick sheets used in the manufacture of small and large boilers and the drawing of copper, brass and phosphor-bronze wire and wire-ropes in use for telephones, telegraphs, lighting, and electricity; these wires are made as thin as $1/20$ millimetre in diameter. Following comes the manufacture of copper and brass pipes of all sizes, employed in the construction of industrial apparatus, and chandeliers. Pipes without solder are made up to a maximum inside diameter of 12 centimetres.

The industries engaged in the manufacture of large copper ware and of cocks and valves, supply locomotive pieces and fittings, and many various utensils in use in agricultural and food-producing industries, sugar factories and refineries, distilleries, breweries and vinegar works; preserves and chocolate works; margarine works; dyeing works, &c.

The small copper ware industry, which uses thin sheets ($1/2$ to 1 millimetre) comprises the manufacture of laboratory apparatus and specially of kitchen utensils and of scullery and butcher's kettles.

Household utensils are made by hammering or by mechanical processes similar to those used for enamelled ware; as a rule they are tinned inside.

The different pieces required in cartridge making, the plates for collectors, the bars and rods for electric appliances may also be mentioned, and finally a few special articles such as busts for stays, manufactories.

The manufacture of chandeliers is one of the most important branches of the wrought copper trade, and

here, as in many other instances, the Belgian manufacturers have found good opportunities for the display of their artistic taste.

Pipes either round or square used in the manufacture of chandeliers and hanging lamps are made exclusively of brass; copper is only used for petroleum lamps which are made on the lathe, and for town, carriage and locomotive lanterns.

The various parts of the chandeliers are merely polished and burnished or decorated with chiseled designs. The silver and gold plating applied to certain articles is obtained by galvanoplastic processes.

There are four factories engaged in rolling, wire-drawing and the making of copper, brass and phosphor bronze pipes, and eight producing industrial and domestic copper ware.

The number of persons employed in this industry is about 400 and the motive power required is 380 H. P.

The total production amounts to nearly 6800 tons per annum, more than 2300 tons of which are sold abroad.

Perforated Metals.

Four factories, situated at Liege, Brussels and in the province of Hainaut, supply the industry with perforated sheets, that is to say pierced regularly with holes, either round or of various shapes and sizes and more or less distant, according to the use, they are destined to.

The metallic sheets used for this purpose are thin; their thickness varies from 3 to 10 millimetres; generally between 1 and 5 millimetres.

Different metals are employed for the manufacture of perforated sheets, according to the use they are intended for. For instance, the iron and steel perforated sheets are used to separate ores, coal and cement; they are used also for apparatus of sugar and malt factories and breweries, for sorting cereals, for iron work, &c.

Sieves are made of perforated zinc for cleaning cereals, for top fittings of blinds, for mosquito screens exported in great quantities to British India.

Red copper is used for manufacturing sieves for textile

industries, paper-mills, distilleries, sugar works, gun-powder mills; and brass for stove-making.

Are also made, but in smaller quantities, tin-plate and lead perforated plates, &c.

Displayed Metal.

One factory produces a kind of lattice-work obtained by discontinuous cutting of sheet-iron in thongs and subsequent drawing. This is called displayed metal, and its principal application is the construction of armed beton floorings.

Brass is sometimes used for the same purpose.

The five works which manufacture perforated and displayed metal, produce about 1100 tons yearly, 650 tons of which are sold abroad.

Wire-Ropes.

There are 11 factories of wire-ropes in Belgium, which supply yearly about 1100 tons of products to industry, and occupy 117 persons, with a motive power of 183 H. P.

These works are almost all situated in the industrial centres of Hainaut and Liege, except one at Termonde.

Wire-ropes galvanised or not, are replacing more and more the hemp ropes over which they possess serious advantages. In the mines for instance, flat ropes of uniform or decreasing section are specially used for winding.

Rigid ropes are used for the handle bars of shafts, for aerial ways, &c.

Flexible ropes are also adopted for tackle in ship riggings.

Let us also signal an interesting application of wire ropes : the sawing of marble in quarries, with thin ropes composed of three wires only.

Wire Gauze.

Lattice, Barbed-Wire and Springs for Furniture.

Wire-Gauze. This manufacture constitutes an interesting little industry, its products receive numerous and

various applications, as well in the field of domestic economy as in that of industry.

Plain or crossed wire gauze is used for making aviaries, footscrapers, strainers, screens, bolters, &c.

The manure works, the factories of chemical products and of ciments, the flour-mills, coal-washing works, the wool industry, the scouring and drying works, consume a great quantity of wire-gauze, which is generally made of steel, sometimes with wires galvanised or tinned. Still in certain cases copper is chosen, for instance, for sieves, bolters, and turbines for sugar-refineries.

Plain wires of phosphor-bronze or brass are used for wire-gauze intended for paper-mill machines, &c., and twisted wire for the wire-gauze of paste-presses, and that of machines used in the manufacture of card-board and packing paper.

Let us mention finally wire-gauze made of special steel, for miners, safety-lamps.

On account of the diversity of its applications, a great many different numbers of wire-gauze are supplied; these numbers are determined by the quantity of links contained in a length of 3 centimetres, or of one French inch (27 millimetres).

Lattice-work. Lattice-work manufactured in large quantities in Belgium, is of two kinds : the single-twist, made with thick wire, and the threefold-twist (English system) made with much thinner wire.

Barbed-wire. A certain amount of barbed-wire for fences is manufactured in Belgium. These products appreciated abroad are partly exported. Barbed-wire is generally made of galvanised steel wires twisted together, one of which, bears fourfold barbs placed at equal distances.

Springs for furniture. Iron-springs under the shape of wire-gauze for easy chairs and spring mattresses for English beds, are, with good reason, the object of an increasing demand.

This commodity, which was formerly imported, is now currently manufactured in Belgium, and this little industry is most likely called to a greater development.

These springs are made of hard steel wires, sometimes copper-plated; they are made with 2, 3, or 4 wires according to the strength required by the purchaser.

Statistics. — The manufacture of wire-gauze, lattice, and barbedwire, spread over all Belgium, employs about 360 persons working in 32 factories; besides these, 13 establishments manufacture specially wire-springs for furniture.

	ANNUAL PRODUCTION (1900).	EXPORTATION.
Wire-gauze.	137,000 m ²	26,000 m ²
Lattice-work	4,433,000 »	21,000 »
Barbed-wire	2,500 tons	800 tons
Springs for furniture . .	1,324 »	63 »

Gold- and Silversmith's Work.

This industry is very flourishing in Belgium; it includes the manufacture of a quantity of articles of luxury in silver copper and brass, used for finery or for decorating dwellings.

Church ware which comprises religious ornaments wrought by hand or by machinery are at present made of brass.

The manufacture of silver plate and specially that of white metal (alloy of silver with 10 to 20 per cent. of nickel) has acquired great importance; the production of white metal ware, also known by the name of ruolz, new silver or Berlin silver, is carried on by improved processes, while hammering is hardly

THE CHASSE OF ST. URSULA, AT BRUGES.

ever used, except for silver ware of which only a limited number of articles, of the same model, are produced. For the latter, two standards are adopted in Belgium: the standard of 9/10 and more generally that of 8/10, with 1/10 or 2/10 of copper.

The small silversmith's work includes spoons, knives and other small articles, while heavy pieces, trays,

vases, &c., belong to the large works. The thickness varies from $\frac{3}{10}$ to 3 millimetres—generally $\frac{1}{2}$ millimetre—for silver and 1 millimetre for white metal.

Most of the gold- and silversmith's ware is finished by polishing, burnishing and chiselling; unpolished silver is produced by tempering; black or oxydised silver by treatment with sulphide of sodium.

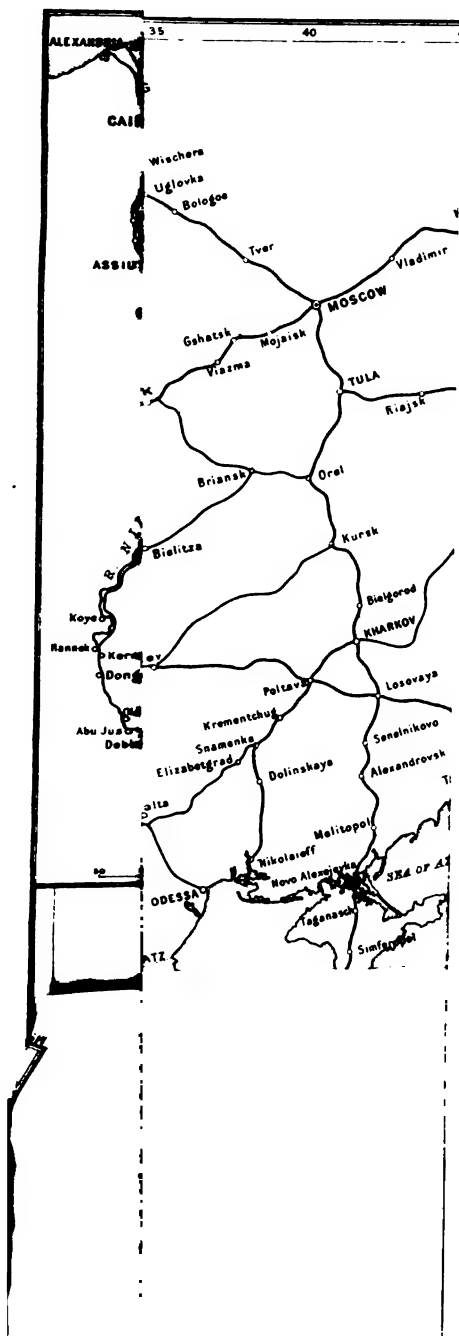
As a rule the white metal pieces are coated with silver, this coating as well as that of gold are performed by galvanoplastic process.

Among finery articles may be mentioned those of filigree, having soldered designs formed of two or three silver-wires twisted together; incrustations are also made with a single wire.

Generally the products of Belgian gold- and silversmith's works are remarkable by their elegance and their high finish; they can compete with similar articles manufactured in the great foreign capitals; the manufactories produce original works of art or reproductions which are very successful.

Belgium possesses one manufactory of silver milled sheets and wire; 26 important silversmiths and 4 factories working white metal. All these industries are established in the following towns: Brussels, Antwerp, Ghent, Liege, Bruges, Malines, Louvain, Namur.

To give an idea of the importance of the silversmith's industry in our country, we shall state that the yearly production of the eight principal establishments, including all the manufactories of silver forks and spoons, is about 11,000 kilog.; 2400 kilog. of which are exported. The total number of persons employed by these firms is about 290.



RELIQUARY OF THE « HOLY BLOOD » AT BRUGES.

INDUSTRY OF FIRE-ARMS.

The manufacture of fire-arms in the district of Liege dates from about the middle of the xivth century, but accurate information is lacking, with regard to the numerous trials which were made at that time, to construct an arm loaded with powder.

Portable or hand-fire-arms appeared towards the xvth century. The first were the cannon and the hand-gun, both adjusted to very heavy, straight butt-ends, difficult to handle, loaded with stones, iron or leaden balls, and lighted by means of a match.

The arquebus and the musket appeared later; both these were made with match-locks (cock or serpentine), idea suggested by the trigger of the cross bow, in order to enable the lighted match to reach the pan immediately.

At the same period appeared the arquebus with rest.

The arquebus is mentioned for the first time by Phillip de Commines in his narrative of the battle of Morat, in 1476.

The complicated mechanism of the arquebus was modified by the use of the wheel-lock, invented at Nuremberg, towards 1517.

The wheel-lock arquebus was generally given to the cavalry, whereas, for the sake of economy, the musket was maintained for the infantry.

The flint-lock was the chief improvement in fire-arms. The first lock was made in France, about the year 1635; its use has since been perpetuated. It has rapidly given rise to serious modifications. The simplicity of the flint-lock (the cock and the flint) was the cause of fire-arms becoming of a general use; it is only from this period that the industry of arms deserves a particular name, that of,

the Arm-manufacture of Liege, which it has so gloriously born ever since.

The first exporters of Liege arms were nail-dealers, who possessed, from immemorial time, commercial relations with the most distant countries; the first manufacturers

THE « FONTAINE DU PERRON » IN LIEGE.

of gun-barrels were smiths, and the first wood-workers, carpenters. Henceforth the latter were called *faiseurs de bois d'arquebuses* (arquebus wood-makers), they formed one of the thirty-two « Good Trades » of the Town; but the barrel-smiths remained a subdivision of the black-smiths

(Good Trade of the *febvres*), governed by special and severe regulations. In the xvith century there existed no special denomination for gunsmiths at Liege.

All this regime was ruled by the Governors (*jurez, rentiers, clerqs, and officiers respectifs* of each Trade). The resolutions taken were approved of by the superior authority and were recognized as law. Nobody could practise another trade than his own, without incurring a fine of three gold florins.

It was since the application of the cock to the gun that the industry of arms could claim a special position and constitute a so called Trade.

The activity that subsequently ruled, at Liege, was prodigious; civil riots, the invasion of foreign armies, all these disasters of warfare which continued to ruin the country, were an exceptional source of prosperity for arm-manufacturers. They could scarcely satisfy the orders which abounded from abroad. Liege supplied arms and ammunition to all parties.

It was soon necessary to regulate this new and already remarkable industry. This the burgomasters of the City, solicited, and obtained by the ordinance of the 10th of May 1672, approved on the 29th of August of the same year, which aimed to the establishment of a Proof House for fire-arms.

From this time hence the gun-trade of Liege made daily progress; the number of workmen assumed immense proportions and in every country of the world, the superiority of the arms manufactured at Liege, was recognized, and the finish of the work greatly praised.

The gun-workmen of Liege, received offers of very high salaries, to induce them to go to France, England, Germany and Austria. Several of them were engaged to work at the Royal Manufacture of Arms of Potsdam and Spandau.

We may also mention that before the establishment of the Manufacture of Arms at Potsdam and Spandau, the King of Prussia had his own arm-manufactory at Liege, where officers resided at his own expense, in order to verify the arms.

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Dating from 1846, new measures were taken concerning

the proof of arms; it was understood that the future of the Liege gun-trade was in connection with a good and rigorous system of tests.

The syndics of the Proof-House, who had first been chosen by the local authority, were elected by the manufacturers of arms who met at a general meeting presided over by the Governor of the province of Liege. Their

THE « PORTE DE HAL », MUSEUM OF ARMS, BRUSSELS.

chief object was to study and seek all the measures that the Government would impose concerning the examination of gun-barrels after the test.

Whole series of Royal Decrees concerning the question of tests were issued. Let us mention among the most important the Royal Decrees of the 8th of September 1846, the 20th of December 1849, which confirmed the authority

of the Director of the Proof-House; the Decree of the 16th of June 1853.

It must be observed that the division of labour is carried out to the extreme, in the manufacture of arms; each class of workmen has its speciality; the general knowledge of the trade is only possessed by the manufacturer; the merit of the distribution of work, and the art of making a gun is also due to him.

It is especially with the preparation of the barrel that the gunsmith must be thoroughly acquainted.

A shooting-gun, a *Lefauchaux*, for instance, undergoes three tests; the first, on isolated barrels; the second, on soldered barrels; the third, when the barrels are completely finished and supplied with their slip-breech.

If the barrels burst at the first test (on isolated barrels) the barrel-maker loses the benefit of his work; he has to replace the burst barrels, without any indemnity. It is therefore in the barrel-makers' interest to supply good raw material.

If the barrels burst at the second test (on soldered barrels), it is no longer only the barrel-maker who is to be held responsible but the smith. The latter also loses the benefit of his work for not having examined his barrels carefully enough before setting to work.

If the barrels burst at the third test, all those who have competed to forge, work and fit them, must bear the consequences; like the former they naturally lose the benefit of their work.

The result of this Liege custom is, that the whole responsibility falls on the workman, and that he is compelled in his own interest to carefully examine, inspect and scrutinize every barrel.

We may add that this test of the barrel is exercised on every kind of arm, fine or common, without any distinction. It will be agreed that with such an organisation, it would be difficult if not impossible, to finish a Belgian arm offering any danger whatsoever.

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The foreign armourers did not remain indifferent to this transformation of the Belgian *Proof-House*, to which

they partly attributed the success of the arm-manufacture of Liege; deputations of foreign manufacturers were sent to Liege. In an interesting work published in 1846 in *the Science of Gunnery* by GREENER (London, E. Churton), we read from pages 200 to 201 : —

« We cannot possibly enter into competition, at the » ruling prices of foreign articles.

» I do not mean to say by this, that the Belgian pro-
» ducts are bad, this is far from being the case, and may
» be easily understood by reading the regulations of the
» *Proof-House* of Liege. They have guns that are good
» and cheap. They are not inferior to ours, and thanks
» to the *Proof-House* we may depend upon them.

» We shall be excluded from all foreign markets and
» supplanted by our competitors.

« Their guns do not burst like your English guns, »
» says the foreigner.

» We shall be excluded, by Liege, from all export
» markets.

» Their testing system is excellent—no matter if it be
» a gun of five or six hundred francs—both must be sub-
» jected to a double test; the first, on the barrel in a raw
» state, and the second, when it is ready to be exported;
» so that if either manufacturer should be misled by the
» lust of gain, what would not be his punishment, with
» barrels which would be liable to explode?

» The punishment for having delivered barrels without
» being tested is much more severe at Liege than here, &c.

» The *Proof-House* is under the control of the Govern-
» ment. »

In 1856, an English Board came to visit the *Proof-House* of Liege, and a report, which was drawn up by them, renders homage to the Belgian Government.

The reporter expresses himself as follows :—

« Thanks to the support of their Government, we see
» Belgian arm-manufacturers making rapid progress and
» becoming dreaded rivals on foreign markets. »

Other committees composed of superior foreign officers, have also visited the *Proof-House* of Liege and have unanimously appreciated the guarantees offered by Belgian regulations. They have been able to verify that the most complete condition of solidity, that the Belgian arm can

offer, does not reside only in the stipulations of these regulations, but that it also results from a series of customs admitted at all times, both by the manufacturer and by the workman.

Let us also recall the general inquest ordered in 1860 by the French Government regarding the treaty of commerce with England : the merit of the Liege gunmaking industry was highly recognized.

* * *

Different Royal Decrees concerning the Proof-House, were afterwards again issued by the Belgian Government; but in 1888 and in 1889 appeared at first a law regulating the situation of the Proof-House of fire-arms established at Liege, and afterwards a general practical regulation, which determined in a definitive manner every thing concerning the tests.

In 1891, a Royal Decree established optional tests with smokeless powders.

This decree was subject to modifications, and on the 8th of November 1903 a new regulation was issued, fixing the conditions of tests with the new explosives.

The Royal Decree of the 20th of November 1903 instituted a special test with smokeless powders for revolvers, rifles and pistols.

England, France, Austria and Germany now possess their Proof-House. Every Government understands that the test of arms is indispensable. Public safety is at stake ; we must preserve it by edicting severe measures against all those who deliver arms, liable to explode, into the hands of persons who make use of them.

* * *

Since a few years the manufacture of arms in the Liege district has undergone a transformation. Besides the manufacture at the workman's own house, where the intelligence and the skill of the workman is specially appealed to, we see very important works established which make the whole of the shooting gun of a definite

type, and where machinery replaces in many instances the hands of the workman. But machinery cannot turn out as good work as the hand, when specimens of arms, having a special stamp of beauty and perfection are required.

Good gun-smiths (and there is quite an army of them in the district of Liege) will always find work; they will be as much in demand in the future as they have been in the past.

This is what the Union of Manufacturers of Arms understood when they created their Professional School of Gunnery, where young men can acquire knowledge which is indispensable to every skilled workman. The Union of Manufacturers of Arms was right in anticipating the future; they wished to prevent the disappearance of good barrel-founders, barrel-smiths, fitters, &c., who make the glory and the reputation of the Liege arm-manufacture abroad. They wished to avoid, that the facility which machinery affords the workman, should cause him to desire to abandon the manual labour at home which requires varied and multifarious knowledge.

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In bringing this notice to a close, we may add that the number of arms tested at Liege since 1820 until the end of 1902 amounts to 66,286,948.

The value of arms exported was :—

In 1894	12,430,000 francs.
» 1895	14,307,000 »
» 1896	15,807,000 »
» 1897	15,300,000 »
» 1898	16,579,540 »
» 1899	19,376,210 »
» 1900	21,023,150 »
» 1901	22,007,100 »
» 1902	21,025,270 »

INDUSTRIES OF MECHANICAL CONSTRUCTION.

The industries of mechanical construction (machines, boilers, iron-framing, &c.) give employment to nearly 30,000 persons in Belgium.

These industries, which are in a most flourishing state, are spread over a large number of establishments; they feed at the same time an important home market and an export trade which chiefly includes the colonies and countries where industry is being developed at the present time, such as Russia, China and Japan.

These industries, some of which have been in existence for three-quarters of a century, find a skilful and experienced supply of labour in the country itself, as well as overseers who have been trained in industrial and commercial schools.

It is beyond a doubt that the progress made in iron metallurgy, such as the manufacture of soft steels, the rolling, the forging and the chasing of great masses of metal, have allowed of rapid progress being made in the art of mechanical construction during recent years.

The Belgian constructors are in a highly privileged geographical position for obtaining their raw material under the most favourable conditions, by exciting competition between their foreign neighbours Germany, England and France.

It is this which gives them a winning advantage in the exportation market.

A. STEAM-ENGINES.

Unceasing studies are being pursued in Belgium on the subject of the steam-engine, both in manufacturing and

scientific establishments. During recent years, the question of compression has been completely studied; a Belgian firm has recently taken in hand practical experiments on a machine of 250 horse-power, to investigate the effect of super heating. These experiments have demonstrated the utility, from the point of view of the yield of the motor, of feeding with over-heated steam. This advantage persists up to 350° of superheating. Some constructors have also succeeded in making machines with a piston heated by steam and in surrounding the cylinder with steam.

The Belgian constructors have succeeded in reducing within their lowest possible limits, the consumptions of steam per useful H. P.; these efforts are explained in a remarkable manner by the rivalry which is maintained from day to day between electricity and steam for certain special operations, such as winding engines, mining-pumps, and rolling machines, and, on the other hand, the struggle set up between gas-motors and steam-motors. Finally, the appearance of steam turbines, new rivals of the ordinary engines, has given a new impetus to the various efforts made to reduce the guaranteed consumption, diminish the up-keep and lessen the price.

The systems of variable expansion, of the most improved type, Bonjour, Frikard, Sulzer, Hoyois, Rider, Corliss, William, &c., are generally adapted to the engines turned out by Belgian machine-shops; they succeed in making compound engines and multiple expansion engines of 100 horse-power and upwards.

The necessity of applying electricity to machinery has made it imperative to bring them to the highest degree of constructive perfection, especially to obtain the different degrees of speed required for dynamos; lastly, special types have been created for direct coupling. Steam-engines driving powerful dynamos, with alternate or continuous currents, have generally a speed which varies between 80 and 120 turns; however motors known as « high speed » are also constructed, giving 500 and over 600 turns for low and medium powers.

As to powerful engines those of the *Centrales de Berlin* may be cited, supplied by a Belgian firm, and each of them capable of developping 4500 horse power.

There has also been constructed for a central coal

station a compound steam engine with two cylinders and 5200 horse-power intended to be coupled with a triphase reciprocating engine.

As to more special applications we may cite winding machines of more than 1000 horse-power, winding from a depth of 1200 metres (nearly 4000 feet), underground pumps worked directly by steam motor, marine engines of all powers, &c.

Lastly, many constructors supply the State and private companies with railway-engines of all types; they are specially constructed with three pairs of wheels coupled for steep inclines and compound types for high rates of speed.

It should also be added that Belgian constructors also take pains about the appearance of their engines and the harmony of the different pieces of machinery.

B. DIFFERENT SORTS OF MOTORS.

The industry of gas-motors and petroleum-motors is also very completely represented in Belgium by a number of important companies.

Gas-motors for lighting are continually being constructed; during recent years the construction of poor-gas motors has been greatly increased; the Cockerill Company in particular have constructed several motors, one of which, of 5000 horse-power, is set in motion by the gas of the blast-furnaces. At the present time, certain metallurgic works have established poor-gas motors of this type of great power, to work their central electric stations.

C. STEAM BOILERS.

The construction of steam generators has been established in Belgium for a very long time; all known types of boilers are also manufactured there.

The employment of soft steels, the construction of stamped and flanged bottoms and the utilization of a mechanical plant in the construction of boilers, has allowed of the realization of very appreciable progress: the use of double and triple rivets on the other hand, allows of the construction of generators under the most favourable conditions of resistance.

BOILER WORKS.

The use of high pressures : 10, 12, and even 15 atmospheres being generalised, these are more and more used. The types which are the most often called for in Belgium are tubular boilers (De Nayer, Belleville) and boilers with inside furnaces; boilers intended for locomotives, locomobiles, and steam ships, are also constructed, as well as special types, such as those of fire-engines.

Boilers form the object of a considerable export-trade.

D. FRAME-WORKS, BRIDGES, &C.

Iron constructions (bridges, frame-works, &c.) play a very important part in Belgian manufacture : many influential companies have made a special study of this branch of construction.

The application of iron frame-works to public and private buildings (churches, railway stations, engine-houses, shops, public-halls) has been particularly developed, and the result is a special type of architecture of a highly decorative kind.

Iron bridges of all spans, straight or arched, are constantly constructed in Belgium, both for the country and for abroad ; Belgian industry has successfully constructed, and put up the steel bridges intended for the Congo railways; one of these is most interesting, as it slopes and curves at the same time and has a considerable span. Recently again there was opened in Holland a great iron swivel-bridge, one of the largest in the world, the work of a Belgian firm.

Many problems of iron construction, all of an interesting nature, and which show off the skill of our constructors, have been solved for engine houses (Antwerp).

Many iron frame-works are carried out in the colonies and the Far East by Belgian companies, which give the greatest attention to these works.

E. RAILWAY AND TRAMWAY PLANT.

The construction of plant for the railway and its accessories forms a special branch of industry for many factories in the country.

First of all should be mentioned : the main section plant : railway carriages, goods and other trucks built by twelve firms which export regularly from 80 to 90 per cent. of their output into every country and especially to Southern and Central Europe.

It was a Belgian firm which founded the organization, of Sleeping-cars, which run over the whole European railway-system.

Besides these, many firms make the accessories and the smaller plant for railroads, tramways, public works, &c.; some of them work their patents, for rolling and fixed stock; these special manufactures also give rise to a very important export trade.

F. MACHINE-TOOLS.

Some Belgian works make a special manufacture of machine-tools for working wood and metal : their principal market is in the interior of the country ; all types are made from the smallest lathes to those weighing several tons. Certain firms are particularly known for the machines (proof benches), for testing metals (cables, chains, &c.) and wire gauze.

G. GENERAL MECHANICS.—SUNDRY MACHINES.

The great industries of extraction, the manufacturing and agricultural industries being met with, all over Belgium, it is easy to explain the multitude of workshops in the country; in fact, numerous and ever-recurring wants have to be satisfied; it may also be said that all the machines required by industry in general are constructed in the country, fans for mines of the latest types, high speed mine-pumps, winding engines, capstans, air compressers, borers, washing machines for coal, all the plant for making coal-briquettes, gazogenes, plant for gas-works and meters; plant for breweries, sugar-refineries and distilleries, threshing and ploughing machines, &c.; plant for linen, wool and cotton industries, refrigerators, &c.

ELECTRIC INDUSTRY.

The industrial applications of Electricity becoming more and more numerous in Belgium, have favoured the development of the various branches of the electro-technical industry. With the exception of measuring apparatus, the whole electric stock can be manufactured in Belgium; the factories occupy about 4500 hands, and taking into account the persons belonging to the numerous establishments which carry out contracts for electric fitting, this figure may be raised to about eleven thousand.

On the other hand, the capital engaged in these industries may be valued at 25 million francs.

The construction of electrical machines ought to be mentioned first; the last ten years have marked a rapid progress in this branch of industry.

Several factories, some of them occupying about a thousand hands, construct continuous current and alternating current generators, with all the improvements up to date, of all powers and for all potential differences. These machines can be directly coupled with steam-motors or with steam or water turbines. Some factories have the speciality of motors of every type and especially tramway motors.

Recently numerous asynchronous motors have been constructed intended to be directly coupled with high-speed mining pumps. All the electric fittings are also manufactured, such as rheostats, tables and controllers, &c.

It is in a Belgian factory that tangential traction was discovered, which is being tested at the present moment on a line of several hundred metres; this invention has secured the Ferrari prize to Messrs. Zelenay-Rosenfeld and Dulait.

The manufacture of patent voltaic arc-lamps and of their fittings takes up an important share of the work of some of the factories. On the other hand some work

shops turn out special types of incandescent lamps which are intended for mining lamps.

Several companies, two of which are very important—construct the entire telegraphic and telephonic plants and everything in connection with them, as well for public as for private concerns.

The manufacture of accumulators is also greatly deve-

TRIPHAASE CURRENT ROLLING MILL.

loped in Belgium and the output is sufficient to supply the inland demand.

Finally to complete this sketch, we ought to mention the manufacture of all kinds of wire and wire ropes as well for telephony and telegraphy as for aerial or underground conveyance of power.

Some of the products just mentioned are used in the country, the remainder is exported specially to England, the Netherlands, Norway and Spain.

ENAMELLED WARE.

Importance.

The industry of enamelled ware has made unceasing progress in Belgium. This is owing to the fact, that the use of enamelled ware is constantly extending, thanks to the advantages of these goods and to the numerous applications they receive.

Moreover the Belgian artisans have acquired great ability in this manufacture. The composition of enamel has not ceased to engross our manufacturers, and splendid results have been attained, as well with regard to strength and fixity as to beauty and variety of tint. These reasons justify the considerable export trade of these wares, which are much valued in foreign countries.

Qualities.

Enamelled ware is made of sheet iron, flanged in the press or by hand and covered with a coat of enamel on all sides. or of cast iron enamelled only on one side; cast iron is used for implements which have to stand fire, viz. saucepans and kettles enamelled inside, and stoves enamelled outside.

This manufacture is specially adapted to household and kitchen utensils of every description such as : saucepans, firepans, goblets, plates, &c., and fittings for buildings such as urinals, sanitary conveniences, sinks; household ware : basins, jugs, umbrella stands, &c.; heating and lighting apparatus : stoves, braseros, hearth furniture,

roasting apparatus, reflectors, gas lamps, &c.; finally doorplates and sign-boards, bicycle plates, &c., imitating china-ware to perfection.

In the same factories, similar articles are turned out in tinned and galvanized sheet-iron in rough or nickelplated cast-iron.

Statistics. There are altogether 26 factories, situated in the provinces of Hainaut and Liege, and at Namur and Brussels, amongst which are a great many important joint stock companies.

These manufactures employ together 4625 persons and use a global motive power of 1138 H. P.; their total production amounts yearly to about 29,000 tons, more than 11,000 tons of which are exported.

Enamelled sheet-iron ware. Prod.	9,000 tons.	Export.	5,000 tons
" cast iron " "	3,600 "	"	1,200 "
Rough or nickel-plated cast iron			
ware. Prod.	16,200 "	"	4,900 "
<hr/>			
Total production.	28,800 tons.	Export.	11,100 tons

Principal exportation countries :—

Enamelled sheet-iron : France, England, Netherlands, Spain, Argentine Republic, East Indies, Switzerland, &c.

Enamelled cast iron (stoves) : Netherlands, Roumania, Turkey, Bulgaria.

PLASTER, LIME AND CEMENT INDUSTRIES.

Plaster.

Belgium possesses very few workable gypsum beds; this raw material proceeds for the greater part from the environs of Paris, and small quantities are imported from Germany.

The burning of the plaster-stone is carried on in improved kilns, which are special to the country, and the products are classed in different categories according to the fineness of the plaster. The extra quality, used by dental surgeons, is entirely free of water; the ordinary qualities always contain about 7 or 8 per cent. of their weight of water.

The average qualities are used for making statues and reproducing artistic articles in general; also for ceiling mouldings; they are also used for moulds by the earthen ware and china manufacturers.

Mixed with alum, moulding plaster forms *stucco* which sets more slowly and afterwards becomes much harder; it is frequently used for the decoration of buildings. The addition to the plaster of gelatine, glue and a little sulphate of zinc makes *stucco* still harder, slightly translucent and resembling marble. The substance commonly called *carton bois*, out of which hollow statues are made, is only plaster mixed with dextrin.

A very practical and very useful industrial application of plaster is the manufacture of tiles. The use of these tiles is absolutely indicated whenever light and uncumber-

some walls or partitions are required. These tiles are rectangular and provided with grooves and tongues; they are 60 centimetres long by 40 centimetres wide and 6 1/2 centimetres thick.

To avoid the propagation of sound, these tiles have been made tubular, but the same result has been obtained by incorporating *wood-wool* (fine packing shavings) to a mixture of plaster, lime and sand; such tiles are stronger than hollow ones, and one of their advantages is that they can be sawed and nailed; besides, they have no hollow to afford shelter to insects; the length of these tiles is 1 metre. Ashes being very light and porous are sometimes substituted to wood-wool.

Boards are also currently manufactured for ceilings and for the facing of damp walls; they are made of a mixture of plaster, lime, ashes and wood-wool. Ceiling boards are directly nailed to the binding joists, which dispenses with the use of laths and renders the building more fire proof.

Belgium possesses 7 plaster manufactories established in Brussels, Ghent, Namur and Tamise, which occupy about one hundred hands, and utilize a motive power of about 200 H. P.

The output reaches at present 40,000 tons a year. Several foreign countries, especially the Netherlands, Sweden-Norway, England, &c., purchase the four tenths of this production. The industry of plaster tiles and boards is exercised by 21 firms, 11 of which are established in Brussels the others in Liege, Antwerp, Ghent, Namur, &c.; the annual output may be valued at about 150,000 square metres.

Lime.

The Belgian soil is abundantly provided with lime-stone. There are numerous works and their products are used not only as building stones but specially for the manufacture of white lime, poor lime, hydraulic lime, according to their composition and their degree of purity.

These different qualities of lime receive numerous applications and are used by the most various industries.

The most important deposits of lime-stone are those of the districts southwards of Louvain, eastwards of Tournai,

on the borders of the Meuse and the Vesdre, in the Entre-Sambre-et-Meuse.

There are about 200 lime manufacturers distributed in these different basins. This industry disposes of a motive-power of 1700 H. P. and employs about 4000 hands.

The annual production reaches 1 million 400,000 tons, 570,000 tons of which are exported. White lime is specially demanded in the Netherlands, France, Germany and the Grand Duchy of Luxemburg, while hydraulic lime is mostly exported to the Netherlands and France.

Cements.

The manufacture of cement is widely developed in Belgium and the works export more than two thirds of their production; the raw material required by this industry, lime stone and clay, are found, with the proper degree of purity, in different districts of the Kingdom.

This industry comprises at present nearly 50 establishments occupying more than 4000 persons and utilising a total motive power of 7700 H. P.

The Belgian works produce and export considerable quantities of *roman cement* or quickly taking cement and *Portland cement* or slowly taking cement, natural and artificial, and also *slag cement* from the blast-furnaces.

The manufacture of artificial Portland cement is the most important; it numbers 14 factories, most of which have adopted the system of the dry way manufacture which allows a more perfect mixture of the raw materials, and in consequence the production of better cement.

There are 27 factories of natural, roman, and Portland cement, a great number of which are established in the province of Hainaut (basin of Tournai) and at Ghent. Four manufactories produce artificial or slag-cement. Besides these, one establishment at Vilvorde produces white cement for ornaments.

The total annual output of cement in Belgium reaches nearly 750,000 tons, about 530,000 tons of which are exported.

Principal exportation countries : United States, Canada, Brazil, Argentine Republic, Hindoustan, Spain, the Netherlands, Sweden-Norway, England, Portugal, Japan, China, &c.

Cement Products.

Compressed concrete. Concrete or *béton* is made with cement, sand and hydraulic lime, and is used in the manufacture of different building pieces. They are said of com-

THE CATHEDRAL OF Tournai.

pressed beton because they are made of successive layers of beton introduced into a mould and strongly rammed down.

The principal products of compressed concrete are sewer and aqueduct pipes, and pipes used in the construction of wells.

These pipes, 1 metre long, are provided with a collar

and a tongue for jointing. Those of small size are of one piece and of circular section; those of large size have an oval section and are made of two, sometimes of four, different segments.

Many other things are made of concrete, such as flooring-slabs, artificial stones and bricks, borders for pavements, posts, window sills and crowns, wall facings, cribs, managers and finally statues and other sculptural pieces for gardens; the latter are made of beton, cast in plaster moulds.

Cement and iron. By applying cement with a trowel or casting it round resisting iron frames, pieces are produced of the most varied shapes, specially sewer and well pipes, hollow hoods for covering walls and even large water reservoirs; the walls of these pieces are from 2 to 4 centimetres thick.

Cement floor stones. Floor stones are manufactured either by casting a liquid paste or by compressing mechanically a slightly wet or quite dry paste. These are sometimes substituted to ceramic or stoneware tiles, for indoor floorings. They are made in plain colour or decorated with inlaid designs tinted in different colours. They are square (generally 20×20 centimetres) and present two layers superposed: one of 2 centimetres, of natural cement, and the other being the top one, of 5 millimetres composed of natural roman or Portland cement to which the colouring matters are incorporated.

Mosaic floor stones are made by incrustation in the top-layer of fragments of different coloured marbles.

Finally, as substitutes for tiles and slates, clamping diamonds are made of natural Portland cement, mixed with gravel separated by means of a sieve.

The manufacture of products of compressed beton, and of beton and iron, occupies 321 persons in Belgium; 9 manufactories established in Brussels, Ghent, Antwerp, Louvain, produce 17,000 tons yearly.

The number of factories of paving tiles and diamond roofing tiles is 32, distributed in Ghent, Liege, Antwerp and in the province of Hainaut. The yearly production is about 1,560,000 tons, more than 200,000 tons of which are sent abroad. Number of workmen: 760; motive power: 250 H P. Principal exportation countries: the Netherlands, Sweden-Norway, South America, &c.

CERAMICS.

Under the head of Ceramic products, are comprised a multitude of utensils and implements made of baked clay and intended for the most various purposes, either domestic or industrial. Such products include all articles in porous pottery (baked earth, fire-proof products, earthenware) and those of compact pottery (artificial stone-ware and porcelain).

All the ceramic industries are represented in Belgium and several of these manufacture far famed wares, which are exported in great quantities.

The greater part of the raw-material necessary to these industries is found in Belgium. Some of the clay-beds, especially those of Boom and the fire-proof clays of Andenne have been reputed for many years and deserve a special mention.

Bricks, Tiles, Paving-Tiles and Drain-pipes.

Bricks. Bricks are manufactured in almost every part of Belgium, but we must make special mention of those called « of Boom » proceeding from the establishments situated on the right bank of the Scheldt, the Rupel and the Nèthe. The brick-yards of this district have at their disposal, clay-beds of inexhaustible richness, and the conveyance of their products by water is very easy. The workmen of these manufactories are very skillful and capable, and their work is not equalled in any other country. Consequently numerous new works with improved equipment, mechanical moulding, continuous kilns, &c., have been erected in this district.

The ordinary bricks are called *klampsteen*; those called *klinkart* are well baked and slightly vitrified, and are used for paving; those which are overbaked are called *padde*.

The *papesteen* are bricks of superior quality, of a more regular form and of a fine red colour; they are reserved for the facings of walls.

The normal size of the bricks of Boom, is $19 \times 9 \times 5$ centimetres for the *klampsteen* and $18 \times 8 \frac{3}{4} \times 4 \frac{1}{2}$ centimetres for the *papesteen*.

Among the special bricks produced in the district of Boom may be mentioned the *derdeling* and the *kleinsteen* smaller than the *papesteen*.

Mechanical bricks for facades, hollow or merely perforated bricks, and moulded bricks with various profiles are manufactured in the best conditions. For the last few years, Belgian brickmakers have undertaken the manufacture of white or coloured bricks called « Silesia » for the facings of buildings.

Finally radial bricks are made for factory chimneys, at Lobbes, Huy and Welkenraedt, &c.

Tiles and panes. The manufacture of tiles and panes has been much developed and is on the same level as that of bricks.

Panes are made of two sizes : either 18 or 21 in the square metre of covered area.

Flat tiles have merely nerves and ledges (21 to the sq. m.) or simple clamps (14 and $12 \frac{1}{2}$ to the sq. m.); they are also made with twofold clamps and double overlappings. Let us finally mention the crest and ridge-tiles, the wall covers, the hollow nerved panes, for roofing, the pugs, the hollow tiles and various ornaments.

Paving-tiles. The red or blue paving tiles are manufactured in the same way as the bricks; they are square with surface smoothed by friction and generally of 16×16 or 20×20 centimetres.

Drain-pipes. The pipes used for draining purposes are also made in the same factories. Their inside diameter varies from 25 to 80 millimetres; there are also collecting drains of 300 to 350 millimetres, inside diameter.

Glazed and enamelled ware. Certain manufacturers supply also black bricks and tiles, varnished with alquifou.

BRICK-KILN.

Enamelled bricks, much used nowadays for decorating the facings of buildings, are quite different products, inasmuch as they are coated with a thicker and more opaque coat. As to majolics, we shall have the opportunity of describing them later on.

Statistics. The number of establishments which manufacture the afore-mentioned wares is about 225, they employ more than 9000 persons and utilise a motive power of about 1600 H. P. Their total output amounts nearly to 13 million pieces yearly.

This is the list of the principal places where brick-kilns are at work : Andenne, Beerse, Boom, Châtelet, Duffel, Hasselt, Hanzinelle, Hautrage, Hemixem, Niel, Mellet, Rumpst, Saint-Léonard, Saint-Nicholas, Steendorp, Terhaegen, Tongres, Tubize, Verviers, &c.

An important exportation of bricks of Boom towards the Netherlands, absorbs more than one tenth of the entire production of this article; panes and paving tiles are also exported to Holland and France.

Baked Earth and common Pottery.

They include a series of wares manufactured with brick clays.

The denomination of *baked earth* pottery is specially applied to statues, vases, fancy ware and ornamental pieces for buildings. Baked earth pottery also includes flower-pots of every size (from 4 to 40 centimetres inside diameter) and also the collar or clamping pipes for water works and chimneys.

As for common pottery, it includes the articles intended for domestic use and which are glazed inside.

About one hundred manufacturers distributed in the whole country and occupying about 600 persons, carry on this industry. Their annual production, is about 11,900 tons.

Special mention may be made of the artistic pottery manufactured in West-Flanders; this specialty exports its products regularly to France, Germany, England and the United States. These artistic articles are an elegant reproduction of the old flemish patterns; they are gene-

rally garnished with ornaments in relief and covered with different coloured glazes applied with a brush.

Common Stoneware.

The name of stoneware applies to hard, compact and slightly vitrified pottery, which is waterproof and resists to acids.

Common stoneware is used for manufacturing sewer pipes and their accessories, certain household utensils and finally recipients for chemical products. These wares are often coated with a salt-glaze.

In the first category of stoneware are included straight or curved drain-pipes, elbows, syphons, joints, embranchments, and other paraphernalia, chimney pipes, wall covers, &c.

Sewer-pipes are generally 1 metre long with inside diameter of 23 centimetres (weighing 31 kilogrammes) : but they are made with from 6 to 30 and even 50 centimetres aperture.

Many other articles are made out of stoneware such as : coffee and beer jugs and jars for preserves, water and liquor pitchers ; jars for preserving butter the capacity of which varies from $1\frac{1}{2}$ to 44 litres.

The sewer apparatus and domestic implements are often manufactured in the same works.

Twenty-four establishments most of them in the province of Hainaut, viz. at Châtelet, manufacture these wares ; their activity progresses constantly and their annual output is valued at 22,000 tons, one half of which is exported to Switzerland, the Netherlands, Spain, South-America, the two latter countries for a small part though.

Pottery ware for chemical products, which as a rule are not glazed, include large bottles and curved pipes for the manufacture of acids, bottles for the conveyance of the same acids and numerous other articles of all shapes and sizes, and also bricks and panes for the manufacture of certain apparatus.

This kind of manufacture is carried on at Andenne. There are altogether five establishments producing yearly 3000 tons, part of which is exported to France and Italy.

Fire-proof ware.

Thanks to the excellent quality and the diversified composition of the fire-proof clay beds which are found in the basins of Baudour and Andenne, this industry is in a position to supply perfect products, possessing the most various qualities, and responding to all industrial requirements.

The reputation of the Andenne clays has long since reached beyond the frontiers of Belgium. These clays are exported in considerable quantities, either raw or after undergoing a simple baking process. With these clays are manufactured the fire-proof bricks and other implements of daily use in metallurgy, in the chemical industry, the glass-factories, the gas works, &c.

The ordinary bricks are rectangular and measure from 22 to 24×11 to 13×6 to $7 \frac{1}{2}$ centimetres. The manufacture of fire-proof bricks also produces bricks for vaultings and other special bricks of peculiar shapes, panes, crucibles for zinc works, retorts for distillation of gas, &c.

The wares most in demand are the clayey bricks used for boiler fire-grates, coke-ovens, puddler and welding furnaces, converters.

The very aluminous earths are used for blast-furnace bricks.

The bricks called *Dinas* are siliceous fire-proof wares used in the construction of glass ovens, the fittings of Bessemer retorts, &c.

Among the special products we must mention the crucibles called of *plombagine*, the paste of which, is mixed with pulverised graphite and coke, and which are used for melting metals.

The basic fire-proof earth bricks, with a basis of magnesia, are used in the manufacture of 'Thomas' steel.

The manufacturers of fire-proof products supply also fire-proof mortar or grout for running in ovens; unwrought baked earth in fragments or powder, pulverised quartz rocks for metallurgy and glass works; finally bricks and other wrought pieces in the raw state, viz. for the pot-ovens of glass-works.

Statistics. The establishments working fire-proof earths

and products are more than 50 in number, distributed in the provinces of Namur, Liege and Hainaut; they employ about a thousand persons and use a motive power of 1300 H. P.

Without including the raw earth and the semi-products, the yearly output may be valued at 215,000 to 220,000 tons, one third of which is exported, specially to the following countries : France, Russia, Germany, Italy, the Netherlands, Spain, Switzerland, England, Turkey, Japan, the United States, South America.

Paving tiles and factory flag-stones.

These tiles are stronger and of better quality than the ordinary red and blue tiles afore described.

These products are divided into three classes :—

1° The paving tiles and the factory flag-stones, the colour of which is as a rule brownish yellow;

The paving tiles of the Quaregnon type used for pavements, porches, stables and coach-houses, are square and measure $14 \times 14 \times 3$ to $3 \frac{1}{2}$ centimetres; they are plain or ornamented with designs in relief, striped, striated, chiselled, ground, with florets, &c.;

The factory flagstones are rectangular and measure 23 to $24 \times 14 \times 3$ to 5 centimetres and are also made either plain or with designs in relief;

2° The paving tiles of the *Sarreguemines* type, of variable tints : white, black, red, yellow, brown. These tiles intended for the inside of dwellings have a smooth surface. They are made of various shapes : square (16×16 centim.), hexagonal, octogonal; their thickness is $2 \frac{1}{2}$ centimetres. Plinths and moulded bricks for façades and wall covers of the same description are also manufactured;

3° The tiles of stone bottle ware with incrustated designs. These are the paving tiles for dwellings, of superior quality, very hard and thoroughly vitrified. They are ornamented with coloured designs, and present often two layers of different colour.

Statistics. The manufacture of these different kinds of paving tiles is carried on in about twenty establishments employing a thousand workmen and utilising a motive

power of 400 H. P. All these works are situated in the province of Hainaut, specially in the basin of Baudour.

The yearly production may be valued at about 850,000 square metres. The exports amount to about one fifth of the total production and are for the greater part composed of stone bottle ware.

The foreign customers for these products are : The Netherlands, France, Switzerland, Norway, Russia, Argentine Republic, &c.

Faience.

The kind of faience (crockery-ware) made in Belgium is the hard or feldspathic variety, generally coated with a transparent glaze, but sometimes opaque or coloured.

Though purchasing the raw material abroad, this industry increases steadily. It owes its success, as well in foreign countries as in Belgium, to the use of scientific processes in the preparation of the clay-mass and of the colours, and to the artistic taste which is displayed in the creation of patterns and the decoration of the ware.

The application of colours, the gilding and bronzing, according to certain designs, is made either on the biscuit, that is to say before glazing, or after glazing. As to the designs they are obtained by different processes : in the lathe, by hand, by bag or pad, and by chromolithographic decalcomania.

The plainest and most usually manufactured articles comprise : table services, coffee and tea services, dressing-table sets, finally white or decorated plate and the sanitary implements. As a specialty may be mentioned the household utensils of the Roekhingham type, coated with a dark brown glaze.

Among the fancy articles are vases of all shapes and kinds, white or coloured, from the cheap bazar article to the artistic article representing a certain value. We ought specially to mention the imitation of old Delft pottery so much sought after by amateurs.

The decoration in relief produces the articles known under the generic name of *Majolics*, the success of which is ever increasing. Majolic ware comprises vases, statues and fancy articles of every description, and articles for

FAIENCE WORKSHOP.

panelling. They are as a rule remarkable for the originality and the elegance of their forms and their decoration, and by the brilliancy and the tasteful combination of their tints.

Next to the majolic wares are the faience-facing tiles, white, coloured, ornamented with coloured designs or in relief as well for facing inside walls as for decorating facades. This industry is very prosperous, owing to the ever-increasing use of these tiles for the decoration of buildings in Belgium and abroad.

The industry of crockery-ware includes also the manufacture of pipes of different qualities, a certain amount of which are exported to France.

Statistics. The manufacturies of faience-ware, number 11 and are spread in the provinces of Hainaut, in Antwerp, Hasselt and Liege. The number of persons employed in this industry exceeds 2500, and the motive power utilised is 700 H. P.

Exports reach about half the total value, which amounted already to 5 million francs, some years ago.

The countries we export these wares to, are : France, the Netherlands, Turkey, England, Germany, Switzerland, Brazil, the United States, the Argentine Republic, Cuba, Porto Rico, British India, Egypt.

Porcelain.

Some establishments manufacture also hard porcelain or genuine vitrified porcelain, characterized by its strength, its sonority and the translucidity of its clay-mass. The raw material *kaolin* comes from abroad.

Besides the wares for domestic use, plain or decorated with various ornaments, this industry produces also certain special articles : jars and mortars for chemist shops and laboratories, and electric insulators.

A variety of porcelain which is not translucent, called *grès fin*, is also manufactured, but in smaller quantities.

There are 3 establishments occupying 350 persons. The total production of porcelain in Belgium is valued at more than 1 million francs, one third of which is exported, viz. to England, the Netherlands, France, Turkey, Germany and British India.

GLASS-INDUSTRIES.

The manufacture of glass under its numerous and diversified applications is one of the most important branches of the industrial activity of Belgium. Its products are known and renowned all over the world, and it may be asserted that there is no country which is not our tributary, especially with regard to window glass, plate-glass and grinding glass.

The privileged situation which Belgium has acquired in this respect, is due to the good quality of the raw material supplied by the country, to the excellent organisation and the improved equipment of its establishments, finally to the hereditary skill of the Belgian workmen.

The following returns, which relate to 1898, will give an idea of the important rank occupied in our production by the various glass industries.

At that time there were 35 establishments employing 23,614 persons and utilising a motive power of 19,913 H. P.; these works had altogether 98 ovens at work : 35 basin and 63 pot-ovens.

The total value of the production for the same year amounted, including the expenses for carriage, to more than 66 millions francs, about 7 millions of which for the products sold in Belgium and 59 millions for the exports.

Window Glass.

Qualities. Window glass is classified as follows according to thickness :—

	WEIGHT PER SQUARE « POUCE » (*).	THICKNESS IN MILLIMETRES.
Glass for photography	14 ounces	1.5
Plain glass	15 and 16 »	1.6 and 1.7
" " of	21 »	5/4
Semi-double glass	24 »	6/4
" " "	26 »	7/4
Double glass	28 »	2.0
Treble glass	32 and 36 »	3.5 and 3.9

The qualities usually manufactured are those of 14 to 28 ounces, viz. of 1 1/2 to 2 millimetres thickness.

Window panes are made of white or coloured glass, they are plain or striated, fluted, diamond shaped.

Bronzed, metallified window glass is also manufactured, as well as the kind called *mousseline*, obtained by engraving with sandblast.

Statistics. Belgium possesses 23 window glass works, all in the province of Hainaut, and specially in the basin of Charleroy.

The annual production amounts to about 33 million square metres, hardly 5 per cent of which are sold in the country, the remainder being exported to the following countries : England, United States, the Netherlands, Japan, Canada, Germany, China, Argentine Republic, Roumania, Switzerland, British India, France, Turkey.

Mirror-Glass.

Qualities. After being polished, plate-glass varies in thickness from 4 to 10 millimetres; the sizes most commonly used are those from 6 to 8 millimetres; beyond 10 millimetres they are used as *slabs*.

The manufactories supply rough plates, ground or polished plates, white, coloured, opaque or veined (imitation of marble and porcelaine), white, black, opal or

(*) French measures.

CRYSTAL AND GOBLET FACTORY (OVEN).

coloured slabs, finally engraved and bevelled plates and engraved slabs.

The tinning of mirrors generally replaces silvering.

Statistics. There are in Belgium 7 manufactories of plate-glass (5 in the province of Hainaut and 2 in that of Namur) which turn out annually about 1 1/2 million square metres.

Nine tenths of the plate-glass manufactured in Belgium is exported principally to England, the Netherlands, the United States, France, Germany, Austria, Australia, Switzerland, South America.

Bottles.

Qualities. This manufacture, which is the object of a special industry, produces all kinds of bottles for wine, beer, liquors, &c., in white, semi-white, green, brown and black glass, and also balloons and large bottles for corrosive liquids.

Statistics. These articles are manufactured in 4 works, all situated in the province of Hainaut, producing annually about 9 million bottles, 96 per cent of which, are sold in the country.

Glass-ware and Crystal.

Qualities. This industry comprises all hollow ware excepting bottles; its products are divided into three classes : ordinary table glass made of common glass, semi-crystal of finer glass, and crystal, which has a very different composition.

This industry, which is extensively developed in Belgium, turns out a multitude of objects of all patterns for domestic use, such as : glasses, saucers, bowls, decanters, salt-cellars, knife-rests, &c.; it also produces glass-ware for laboratories in ordinary or tempered glass, for electricity, lighting; reflectors and lenses for the navy, &c., &c., and, finally supplies the commodities suitable for all needs and answering to all demands, from the plainest current articles to fancy objects of cut crystal, often remarkable for their artistic stamp. Owing

CRYSTAL CUTTING.

to special care in the workmanship and to improved equipment, moulded articles have been successfully turned out imitating to perfection hand cut crystal.

The industry of crystal fancy articles is characterised by the constant endeavours to produce more and more elegant models, and to obtain a diversified and pleasing ornamentation in which the art of colouring is taxed to its utmost.

Many coloured objects are made of flashed glass, that is to say having two superposed layers of different colours.

Ornamentation is applied by numerous processes such as wheel engraving or grinding, which allows the most artistic outlines; engraving with the aid of acid to reproduce geometric designs, frosting or imitation of hoar frost, application of white enamel, and finally by hand painting, gilding, &c.

Statistics. Belgium possesses fifteen goblet and crystal manufactories, situated in the provinces of Liege, Namur, Hainaut and Antwerp.

The annual production may be valued at more than 130 million pieces, the four fifths of which, are sent abroad, principally to England, British Indies, France, Turkey, the Argentine Republic, Holland, China, Chili, the United States, &c.

CRYSTAL-WARE.

CHEMICAL INDUSTRIES.

Sulphur.

An important sulphur refinery is established at Antwerp; it has the most important apparatus, and is provided with all the improvements required by health and sanitation.

The output of this establishment amounts to 6000 tons a year, the greater part being intended for exportation.

Sulphur is not much employed now for the manufacture of sulphuric acid, but it has many other important uses. It is principally used in large quantities as raw material in the manufacture of gun powder, ultramarine blue and carbonic disulphide; when transformed by combustion into sulphur dioxide, it becomes a powerful agent for bleaching wool, silk, straw, &c. It is also used in sugar-mills.

As for flower of sulphur, or sulphur obtained by sublimation, and perfectly neutral, it is chiefly used for the vulcanization of india-rubber, and it also finds a considerable market in wine-growing countries for dusting vines.

Acids and mineral salts.

The production of sulphuric, nitric, and chlorhydric acids, sodium sulphate, alumina sulphate, and alums, forms part of what is called the great chemical industry.

The number of works concerned with this production is 16. They are distributed among the provinces of Antwerp, Liege, Namur, East Flanders and Hainaut. They give employment to about 1350 persons, and make use of a motive power of 914 H. P.

Sulphuric acid plays the greater part in this production (300,000 tons a year). It may be stated that this acid is made almost entirely with gas produced by the roasting of blendes in zinc-works; gas which these works are obliged to condense.

These metallurgic establishments have been forced to set up a series of apparatus for the manufacture of chemical products, and even to join to these, workshops for the preparation of soluble superphosphates, in order to

MANUFACTURE OF SULPHURIC ACID.

make the best of the large quantities of sulphuric acid which they produce.

The production of chlorhydric acid and sodium sulphate, which constitute secondary products of the manufacture of soda by the Leblanc method, decreases more and more with the generalization of the new Solvay process.

Nitric acid is manufactured in ten works, which produce together about 10,000 tons a year. Nitric acid is chiefly used in the production of sulphuric acid, dynamite, &c.,

It is also supplied in all the various forms required by the wants of industry and trade.

The production of alumina sulphate and alums may be estimated at 6000 to 7000 tons a year. About 30 per cent. of this quantity is sold abroad.

Soda and bleaching chlorides.

The old method of making soda by the Leblanc process has been in turn superseded by the Solvay process which, involving a real revolution in the chemical industry, has made it possible to supply at an increasingly low price and in a high degree of purity, the carbonate of soda, which is used in the manufacture of a great number of products indispensable in modern life.

The works which the Solvay Company have established at Couillet for the application of this process employ 400 persons. The output at the present time amounts to 30,000 tons a year of carbonate of soda, part of which serves for preparing crystals of soda, caustic soda and calcium chloride.

Similar establishments of great importance have been rapidly erected in most of the manufacturing districts. Solvay soda is now produced on a large scale in France, England, Germany, the United States, &c.

As an adjunct to the manufacture of soda by the ammonia process, the Solvay Company practically realizes the electrolysis of sea-salt, with the object of obtaining chlorine and bleaching powder.

To this end, the Company has established a great work at Jemeppe on the Sambre, furnished with all the most modern appliances, and in which is carried out, on a large scale, the electrolytic production of lime chloride. This establishment makes use of a motive power of 1500 H. P., and employs 120 persons. It produces 6000 tons a year.

The Solvay Company is also concerned in the economical and yet abundant production of waters containing ammonia to serve as raw material for the manufacture of soda. For this purpose, it has established, in 10 places in the provinces of Hainaut and Liege and for various metal and coal enterprises, improved coke ovens (Semet system), making it possible to realise the recovery of the second-

dary products. These works, which contain altogether 579 ovens, produce on an average 850,000 tons of coke a year and 35,000 to 40,000 tons of coaltar.

The waters containing ammonia are, as a rule, concentrated in the same works to the term of 18 and even 26 per cent, in order to allow of their transport. A part of these waters is transformed into anhydrous ammonia or ammonia sulphate to serve as nitrogenous manure.

As for the old works which used to manufacture soda by the Leblanc process, they have been obliged to change their system altogether, and now they are employed in the production of chlorhydric acid, chlorine and caustic soda.

Small chemical industries.

By the side of the great chemical industry, and so to speak tributary to it, are placed a number of chemical products used in industry, medicine and domestic economy. Among others may be mentioned the different salts of soda, potash, &c., and more especially :—

Bicarbonate (production 117,000 kilogrammes—nearly 115 tons, two-thirds of which are exported).

Acetate and, as a derivative, acetic acid (production 500 tons; 330 tons of which are sold abroad);

The salts of potash and soda, obtained by the calcination of the beetroots or the residue of the distilling of treacle (production 3000 tons);

Potassium nitrate or saltpetre (3 works and 80 workmen; production 3000 tons, two-thirds of which are sent abroad);

Potash (8 works, 116 workmen);

White lead or lead carbonate (9 establishments, 365 persons; production 7000 to 8000 tons, two-thirds of which are exported).

A number of other products should also be mentioned, such as alkaline silicates, potassium cyanides, sulphate and hyposulphate of soda, tin chloride, zinc, white borax, copper and iron sulphate, hydrofluoric acid, phosphoric acid and alcalin phosphate ultramarine blue, &c.

These minor industries include 13 establishments, which employ 468 persons.

Chemical manures.

The production of chemical manures is continually being developed, thanks to the progress of scientific farming, and the increasingly general adoption of scientific processes in agriculture.

There are no less than 139 factories, employing more than 2000 persons and using a motive power of 723 H. P. The principal products of these works are ammonium sulphate and chloride, soda nitrate and especially superphosphate of lime, obtained by the action of sulphuric acid on the neutral phosphate. The latter is found in abundance and very pure in the Mons and Liege basins.

The production of superphosphate reaches 250,000 tons a year, half of which is sent abroad.

The said works furnish superphosphate of all richness from 8 to 20 and even 40 per cent.

In the gelatine factories, bone phosphate (tribasic) is also produced.

We may finally mention the basic slag containing the phosphorus which is removed in the smelting of iron by the Thomas-Gilchrist process, and which, when pulverized, is sold as neutral phosphate manure.

Colours and Varnishes.

By the side of the chemical industries may be placed the manufacture of colours, varnishes, inks, pastes, and various coatings employed in building, furnishing, carriage-work, glazing, &c. These minor industries are carried on by more than 90 works employing nearly 900 hands. They are generally established in the large towns and in the manufacturing centres.

CANDLES, GREASES AND INDUSTRIAL OILS.

Candles.

Belgium possesses 5 candle factories, 3 of which are at Antwerp and 2 at Brussels, employing 1129 persons, and using a motive force of 521 H. P.

This manufacture has been brought to a high pitch of perfection, both with regard to the production and to the quality of the products. These are also growing more and more in favour with foreign consumers. The production, which increases every year, amounts at the present time, including stearine, to above 10,000 tons, more than half of which is exported.

Subsidiary products, which also find a market abroad, are oleic acid (5000 tons a year) and glycerine (1500 tons a year).

Greases and Industrial Oils.

Belgium being essentially an industrial country, the manufacture of greases and oils has naturally been greatly increased. The raw materials which are employed, produced at home or imported, are of vegetable, animal or mineral origin. Linseed and rape-seed, produce alone more than 80,000 tons of oil a year. The preparation of grease-oils by rectification of the residuum of naphtha is carried out by several important works in Brussels.

The total number of oil-mills in Belgium is 425, employing more than 3000 persons and utilizing a motive power of 5300 H. P.

Manufacture of soap.

The soft potash soap, for household use is manufactured almost all over Belgium.

Hard soda soaps, such as Marseilles soap, are especially manufactured at Antwerp.

Soap in the form of powder and fine toilet soaps, are made at Brussels, Waterloo, Mons, &c. As to this last

MANUFACTURE OF SOAP.

type of products, our manufacturers make continual progress, and their soaps are exported at the present time into every country in the world, where we succeed in defying competition with the most celebrated products of a similar kind made by foreign manufacturers.

Our soap-works, 187 in number, employ 1216 persons and use a motive force of 333 H. P.

Matches.

The match industry is very important in Belgium. It comprises 18 factories, situated chiefly at Grammont, Ninove, Lessines and Denderleeuw.

The staff employed in these establishments numbers 2608 persons and a motive force of 711 H. P. is used. Five factories make nothing but phosphoric matches; 11 produce Swedish matches in competition with the former; only one factory produces wax matches.

The total annual production may be estimated at five and a half million gross of boxes. More than $\frac{4}{5}$ of the products are sent abroad, principally to England and the Indies, Hamburg, North America and the East (Turkey, Tunis, Egypt, &c.).

Aspen wood intended for the manufacture of the sticks comes generally from Russia; some factories receive the sticks ready made from that country. The wooden boxes of the country are generally made by machinery in the fabrics themselves; a small part is the product of manual labour of home workers.

The various kinds manufactured are : —

The matches called « Swedish » with *brown heads, red heads, and red sticks and yellow heads*, the latter being often impregnated in such a manner that they do not glow when they are extinguished; English matches, treated with paraffin, lighting all over, and known as *crackers*; ordinary phosphoric matches, and German phosphoric matches with a round stick and blue head.

The Swedish boxes contain from 55 to 60 matches. They are sent to England in wooden cases containing 50 gross wrapped in tarred paper. When exported to other countries, Swedish matches are delivered in cases containing 1, 2, 3, to 6 packets covered with zinc.

As to phosphoric matches, the boxes contain on an average 300 sticks, and are packed in cases at the rate of 1 to 6 gross.

MANUFACTURE OF PAPER AND CARD-BOARD.

The paper industry grows more important every day, and its products are exported in great quantities into every country in the world. The factories are scattered throughout different parts of Belgium, chiefly in those localities where they are sure of finding an abundant supply of pure water. A great part of the raw material which is necessary for these factories is found in the country, such as linen and cotton rags, linen waste, cords and threads, which form the basis of papers of good quality; the straw of rye, wheat, oats, barley, &c., which the country also supplies.

Other succedaneous matters, such as alfagrass, natural woods or woods already transformed into pulp (half-paste) are, most of them, imported from abroad (the north of Europe, Canada and the United States).

The materials which are added to give weight, and the chemicals employed for bleaching, colouring and pasting, are also easily provided.

The manufacture of paper is performed almost entirely by machinery; paper is only made by hand on a very small scale, for the manufacture of postage-stamps and bank-notes.

The papers of ordinary production may be classed under five different heads.

1. *Packing paper*, which is made from every kind of raw material, according to the qualities which are to be obtained. Under this head a distinction is made between ordinary and fine packing paper.

Straw papers coated with different coloured papers

also come under this head. Fine packing-paper, which is made with light-coloured pastes, includes : common foolscap paper, blue paper for chicory, paper for wrapping textile fabrics, transparent paper known as cellulose, made entirely of wood-pulp, imitation parchment and foreign note-paper.

2. *Paper for newspapers*, or ordinary printing paper, which always contains a large quantity of machine-made wood paste : this is white paper of inferior quality;

3. *Ordinary papers*, which are made with different substitutes for rags and contain a large proportion of machine-made paste. Under this head come layer-paper, i. e., paper intended to receive a layer of colour, wall-paper; paper for the backs of playing-cards, for cop tubes of spinning-mills, for covering match-boxes, for tramway tickets, and for lining card-board boxes (pasting-paper);

4. *Semi-fine and fine papers*, which contain no wood-paste, and the better qualities of which are manufactured entirely of rags; under this head are included printing paper for books and writing-paper; sundry papers, such as coloured paper for fine wrappings, blotting-paper, drawing-paper, thin copying-paper, card for visiting-cards and post-cards.

5. *Special papers*, including a large number of kinds used for different purposes, such as :—

(a) Vegetable or parchment paper including several varieties : paper for packing greasy substances (dry, ordinary supple or glycerine-supple); red or white paper for combed wool spinning-mills; parchment for osmose, used in sugar-factories, opaline, tracing-paper;

(b) Gelatine paper, specially used for writing;

(c) Art-paper, specially intended for printing phototypes;

(d) Cigarette-paper;

(e) Duplex paper, formed of two layers pasted together, to which different tints may be given.

Card-board.

Grey card board, half-white and paste-board are especially manufactured in Belgium.

The first kind of card-board is made in rolls with old papers and is generally very thick. *Felt-card-board* or woolly card-board, used for the manufacture of bituminous card-board, is a speciality which is contained under this head.

The second kind of card-board which is made in Belgium is called *paste board*, machine made, straight and in *rolls*; it is very largely exported into England and is obtained by pasting together, by machinery, several sheets of card-board.

Statistics. The manufacture of paper, in Belgium as in other countries, has passed through many fluctuations in recent years. Nevertheless, the average production at the present time may be put down as 70,000 tons a year, more than three fourths of which are exported into every country in the world.

Writing and printing-paper, paper for newspapers, strong paper for packing and paste-board are chiefly exported.

Principal exportation countries : England, East Indies, the Netherlands, the Argentine Republic, Brazil, France, Australia, Spain, Germany, China, Japan, the United States, &c.

Belgium also exports from 25,000 to 30,000 tons of wood paste every year.

The paper industry is chiefly concentrated in the provinces of Brabant, Antwerp, Liege and Namur. Without reckoning 3 minor works producing nothing but wood-paste, there are in Belgium 47 factories which produce ordinary paper, packing-paper and card-board. Some of these establishments are of great importance and are widely known.

The total staff employed in the paper-mills numbers about 6500 persons, and the motive force used is nearly 10,000 H. P.

Preparation of Paper and Card-Board.

The processes applied to paper and card-board are as numerous as they are diversified. In Belgium the preparation of these two products admits of a certain number of

small and medium sized industries carried on in 377 establishments, giving employment to about 3000 persons and using 800 H. P. The various factories which make use of paper and card-board as raw material are generally established and concentrated in the manufacturing districts of the country and in the large towns such as Brussels, Antwerp, Liege, Ghent, &c.

In the preparation of paper, two entirely distinct departments have to be considered. The first consists of the *dressing* of the paper and card-board, which is then sold in sheets or in rolls; the second is the *making-up* of paper and card-board into a number of articles of the most diverse shapes, appearance and use.

Dressing of Paper and Card-Board.

In this department are placed, on one hand glazed and impregnated papers and card-boards, on the other, layered, coloured papers, wall-papers, photographic papers, &c.

Glazed and impregnated Papers and Card-Boards.

1. *Water-proof paper* used for special packing. These papers can be glazed on one face only: tarred paper, black waxed paper, varnished paper in several tints. They can also be impregnated right through: papers known as damp-resisting, paraffined, oiled, ozokerite, made with silk paper, and imitation-parchment paper: these are used for fine packing.

More solid water-proof papers are manufactured, lined with a textile fabric: muslin or bunting, jute or hemp cloth, laid on to ordinary packing-paper by means of a waxy glaze containing glue. The *water-proof cloth*, *Congo State type*, which is made of jute cloth, fixed on to imitation parchment with glaze and which has a base of india-rubber, is particularly noticeable.

Silk paper, union-peel paper and imitation parchment are also lined with muslin, cotton cloth or flax cloth.

2. *Bituminous card-board* for roofing, made of woollen felted card-board, impregnated with a mixture of coaltar and pitch and covered with a slight coating of sand.

These card-boards, the thickest of which weigh 500 grammes (1 lb.) per square metre (about 3 1/2 feet), are supplied in pieces 1 metre wide by 10 to 20 metres long.

Bituminous cloth for roofing is also manufactured.

3. *Glass, sand, and emery paper*, for which is used strongly pasted packing-paper and also paper lined with linen. This is made by machinery, the sheets are 25 centimetres by 30 (about 1 ft. square).

4. *Special card-board known as paste-board*. By these are meant card-boards of which are required the special qualities of strength and durability. Instead of being machined or rolled direct, they are made of several sheets of paper placed one upon the other and pasted together.

In this way are manufactured—card board for the *cap-trade*; *Jacquard* card-board, for putting textile fabrics on card, supplied in sheets of 50 to 65 centimetres (1 1/2 ft. to 2 ft.); card-board *glazed* on one or both faces, for dressing textile fabrics, for electric collectors and for calking lace; card-board intended for the manufacture of railway tickets, theatre-checks, targets, machine joints and turbine cones, &c., lastly, *millinery* card-board, and *Bristol* and *ivory* card-boards for visiting-cards.

5. *Artificial slates for school-children* made of a thick card-board dressed with a thick glazing on both faces. Slated paper for tables and other articles of the same kind are also made. Artificial slates are exported in large quantities to Turkey, Greece and the different States of South America.

Enamelled and Coloured Papers, Wall Papers, Photographic Papers, &c.

This class includes papers dressed with colours or glazing after their manufacture :—

1. *Coloured and enamelled papers*. This industry, which has been brought to a high degree of perfection in Belgium, has its seat in the town of Turnhout. The manufacture of coloured papers has attained a considerable importance in recent years, and almost the whole of the production, amounting yearly to 450,000 reams of 500 sheets each, is sent abroad, principally to England

and her Colonies, France, the United States, Spain, Turkey, Egypt and Japan.

Coloured and enamelled papers are of two kinds : *plain* papers, made by machinery, and fancy *marbled* papers, made by hand. Water-colours are employed for both of them ; the colours may be fixed by means of processes which remain the secret of the manufacturers.

Plain papers, which are specially used for ornamenting card-board boxes, are turned out in reams or on reels, they are simply polished, or else enamelled, glazed, glossed, gilded, or silvered ; as a special line may be mentioned the *art paper* or *illustration paper*, treated with a layer of white colour.

Shagreened, watered, moroccoed, and other fancy papers, for book-covers, showing patterns in relief obtained by diapering or embossing machines, constitute a transition with fancy or marbled papers.

The latter, which are generally coloured by hand, are especially employed in book-binding.

Marbled papers are divided into two classes. The first are manufactured with the vat ; their principal qualities or designs are the comb or nonpareil, Turkish or Greek marbled (or pebbled), the scroll, English marbled, shaded or Spanish, the Storment, the Variegated, the Indian, the Wanda, the sun paper, and the antique comb. The marbled papers, not manufactured with the vat, include the *Aunonay style*, mosaic paper, dead coloured paper, sprinkled paper, &c.

Marbled papers are generally glossed. The sizes the most in demand are the *double crown* 51 centimetres by 76 (1 1/2 ft. by 2 1/2 ft.) for England, and the *grape* 51 centimetres by 65 (1 1/2 ft. by 2 ft.) for Belgium, France, Spain, &c.

2. *Wall-papers*. The wall-paper industry, which is considerably developped in Belgium, admits of a dozen factories employing 350 hands ; these factories consume more than 2000 tons of raw paper a year, corresponding to a production of at least 8 million rolls. Nearly half this production is sold abroad, chiefly to France, Holland, England and her Colonies, Germany, Switzerland, Spain, South America and Italy.

Wall-papers present a great variety of patterns, colours

and qualities. They are said to be of *natural ground*, when the pattern is applied direct on the raw paper, white or coloured, or else *laid ground*, when the paper used has been previously coloured.

The patterns, the models of which are generally made by Belgian artists, are applied either to white or previously coloured paper.

For the ordinary qualities, the pattern is impressed on the ground by means of a printing machine. For ornamental papers, the old method, known as the *block system*, is employed, allowing of a great precision and a more artistic style. Sometimes the two processes are combined, certain colours only being printed by the block system.

Besides ordinary wall-papers, the factories also produce papers presenting certain special effects, such as gilded papers, velvet papers, reps, moire, *repoussé*, imitations of gilded leather, painted windows, &c.

As supplementary articles, we may mention finally papers intended to form wainscottings or framings for pictures; they are generally painted by hand on a plain ground, or they reproduce imitations of marble, wood, china, plaques, &c.

3. *Photographic papers* or papers sensitive to light. These papers are divided into two classes.

In the first class are placed papers for the printing of artistic pictures, the production of which is considerable and which are exported into every country in the world.

They consist of several kinds. The papers called by *blackening direct* are prepared with citrate, chlorocitrate or silver chloride, as well as collodium chloride of silver. The papers called by *development*, for printing by contact and for enlarging, give pictures of absolute unalterability; these papers have a base of gelatino-bromide or gelatino-chloride of silver. The paper for the *carbon-process* gives photographs which are absolutely unalterable.

The second class consists in papers for the production of manufacturing designs; they are prepared with iron salts; let us mention especially the ordinary paper with ferro-prussiate, that with ferro-cyanite and the heliotype.

Paper Articles.

Lace paper, or paper cut in scalloped strips following a certain pattern; this paper is used for ornamenting kitchen cupboards.

Confetti. This article is made on a uniform scale and exported to the United States, Brazil and other South American countries.

Writing paper and envelopes. The manufacture of writing paper and envelopes is often carried on in the paper-mills themselves, or it forms a separate industry. For this purpose ordinary and semi-fine papers are used, especially English cream-laid and French vellum.

Ruling. In the large paper-mills the workshops often have a department annexed for the ruling of paper intended for registers. These are made in houses which are specially concerned with binding and printing.

The quantity of ruled paper annually manufactured in Belgium amounts to several million tons. Part of the production is sent abroad.

Bags or Sachets. These articles are made of packing-paper of every kind, ordinary and fine, according to the nature and quality of their contents.

The manufacture of sachets, which increases every year, is generally carried on by hand; it gives employment to 800 persons, and its annual production exceeds 3000 tons.

Lamp-shades, flowers and wreaths in folded paper. In Brussels there is a factory concerned with the manufacture of fancy and ornamental articles, which are made of coloured silk paper. These articles are also sold abroad.

Card-Board Articles.

Cop tubes for spinning mills made of an unpasted sheet of paper rolled a certain number of times on itself. These cop tubes are used by cotton and wool-spinners. Those most used are the *light tubes*, conical or cylindrical; then come the cops for cotton and *heavy tubes* for continuous machines. The annual production exceeds 1100 tons.

Draught-Boards and toys. These articles are also made of several layers of special very stout packing-paper.

Boarding. The boarding industry includes the manufacture of all kinds of boxes made of card-board lined with paper. The quality most used for ordinary boxes is thin paste-board, known as machine-made; as to the paper employed, it is generally without wood-paste and with a good load. Boxes are made mostly by machinery, but a part of the work has to be done by hand.

Many kinds of card-board boxes are produced, from the ordinary qualities to ornamental boxes for confectioners, &c.

Special mention should be made of the flexible boxes, which take up very little room.

Playing-cards. The manufacture of playing-cards constitutes a special industry which has its seat at Turnhout, in the same works in which coloured papers are made. This town is one of the most important centres of production for this kind of article.

Our establishments supply playing-cards to every country in the world, and have plant for making games of cards of the most diverse qualities and the most varied effects, responding to the requirements and habits of all the people who make use of articles of this kind. We may mention among others, Indian cards, Spanish games, Chinese and other little games for children.

The manufacture of playing-cards uses about 1900 tons of paper a year, which corresponds to a production of more than 100,000 gross of games, two-thirds of which are destined for foreign countries.

WOOL SPINNING.

Wool is a very valuable textile. This fact explains the meticulous care bestowed on the treatment of this fibre not only in the raw state, but even when proceeding, in the

THE LION OF THE « BARRAGE DE LA GILEPPE » (43 ft in height).

shape of waste, from the different processes of combing, spinning and weaving. This explains also the division of labour which characterizes the industry of wool and the

number of special establishments cooperating to the transformation of this fibre into yarn.

A few large firms have concentrated all the operations of spinning under one single management, but such concentration requires an enormous capital, and few establishments are in a position to do this. In consequence the ordinary case in this industry, is specialisation. Accordingly we shall divide the establishments concerned with the working of wool in view of transforming it in yarn, as follows :—

- 1° Establishments for wool-washing and chemical cleaning ;
- 2° Manufactories of artificial wool ;
- 3° Combing works ;
- 4° Combed wool spinning mills ;
- 5° Carded wool spinning mills.

Establishments for Wool-Washing and Chemical Cleaning.

These works situated for the greater part in the neighbourhood of Verviers, enjoy a European reputation.

Thanks to the abundance and the purity of the water supplied by the reservoir of La Gileppe, and to the careful sorting and purification of the material under treatment, the wool-washing establishments and carbonizers not only supply the home-spinning-mills, but manipulate materials supplied by the German, Austrian, Russian, French, &c., manufacturers. Our establishments admirably situated to this end, manipulate during their conveyance to Germany the materials imported to Antwerp, and often alleviate them of a considerable dead weight which reduces to a great extent, the carriage expenses to be paid by the manufacturers, who apply to these establishments.

The Belgian wool-washing and cleaning works treat yearly more than 60 million kilogrammes raw material composed of wool, either raw or merely scoured, of noils and waste from combings, the latter merely treated by carbonizing.

The raw and scoured wool proceeds from Australia (19 million kilogrammes), Montevideo and Buenos-Ayres (16 million kilogrammes), from the Cape (5 1/2 mil-

lion kilogrammes); the remainder consists of wool from Morocco, Spain, France, Russia, &c. The waste from combings proceeds partly from the country and partly from France, England, Germany, &c.

With a working population of 2173 hands and a plant of 114 leviathans, the industry of scouring and cleaning pro-

THE « BARRAGE DE LA GILEPPE ».

duces annually over 30 million kilogrammes scoured and carbonized wool and waste.

In the shape of by-products, this industry gives the *yolk-waters* which after treatment leave *yolk-polash*. The waste produced by beating (dust) supplies an azotic manure of great value, partly consumed by the home-agriculture, partly exported into France.

Artificial Wool Manufacture.

Belgium possesses about ten manufactories, which, with a working population of more than 600 hands, perform the tearing and carbonising of rags. The rags supplied by half-wool textiles are always carbonised, that is treated

by a sulfuric acid bath with a view of destroying the vegetable substance (cotton).

In order to sort the different coloured rags these are often redyed black.

Our manufactories of artificial wool produce on an average 5 million kilogrammes rovings of pure wool and 1,300,000 kilogrammes of wool and cotton (*).

The value of the rovings varies according to their nature and their origine, from fr. 0.50 to 0.60 the kilogramme, to 3 and 4 francs the kilogramme.

Combing.

In the great French wool-manufacturing centres, namely at Tourcoing, Roubaix, Reims and Fourmies, combing is the object of a distinct industry. Belgium possesses only one establishment, at Hoboken, practising solely combing. The other combing establishments are in connection with combed wool spinning-mills.

Belgian combing works treat yearly, on an average, 21 million kilog. raw wool, 6 million kilog. of which are Australian wool; 13,500,000 kilog. Buenos-Ayres wool and 1,500,000 kilog. European wool. After scouring this quantity is reduced to about 10,500,000 kilog. of wool, undergoing carding processes, preparations for combing and finally combing itself, to produce 6,730,000 kilog. of combed ribbon and about 1,800,000 kilog. of noils. We export about 2,500,000 kilog. of combed ribbon, especially to Germany.

The Belgian combing industry utilizes a plant numbering 340 combing machines of the Heilman type and 5 circular combing machines.

Combed-wool Spinning Mills.

The combed-wool spinning mills treat annually from 12 to 13 million kilog. of ribbon proceeding for the greater

(*) Certain spinning-mills unravel the rags themselves, their production is not included in the above-mentioned figures.

CARDING-MACHINE FOR A COMBED WOOL SPINNING MILL.

part from the combing of Australian wool (4,2 million kilog.) and of wool from Buenos-Ayres (6,5 million kilog.).

This ribbon is supplied up to 4,500,000 kilog. by Belgian combing-works, to 7,400,000 kilog. by French ones and to 2,700,000 kilog. by English ones, finally to the amount of 150,000 kilog. by German combing works.

With a plant of 242,000 spinning and 67,000 twisting spindles, attended by 4600 hands, this industry produces yearly 5,500,000 kilog. of plain yarn and 6,200,000 kilog. of twisted yarn intended for the manufacture of cloths of combed wool, or hosiery, trimmings, &c. It exports from 35 to 40 per cent of this production to England, Germany, Switzerland, the Netherlands, Sweden, Norway, Russia, Egypt and even Japan. The remainder is destined for home use.

Carded Wool Spinning Mills.

This speciality viz : the spinning of carded wool, is certainly the one that has most contributed to spread the reputation of the wool industry of Verviers throughout the whole of Europe. This reputation is due to the intelligence of our manufacturers and the professional skill of the artisans of Verviers.

Since a few years, fashion has favoured the fabrics of combed wool, and consequently the field of action of the former industry has been much restricted. Besides this, the increase of custom-duties in certain countries and specially in France, has rendered more difficult the exportation of Belgian carded yarn.

The industry of carded wool utilises scoured wool, noils, artificial wool and other waste.

With a plant of 475 machines working 340,000 spinning and 22,000 twisting spindles, this industry produces more than 13 million kilog. of yarn, 11,880,000 kilog. of which are plain yarn. The greater part of this yarn is used for manufacturing clothes, about 500,000 kilog. are absorbed by the manufacture of hosiery.

Unbleached, white, mixed, dyed and fancy yarns are made with carded wool such as : budded, curled, marbled, &c., &c. ; wool is also mixed with cotton, producing mixed yarns called : vigogne, lama, &c.

COTTON SPINNING-MILL.

The Belgian carded wool spinning mills export about 60 per cent of their output. England has always been our principal market for carded yarns, and she still purchases about 5 million kilog. yearly. Carded yarns are also exported to France, Germany, Austria, Russia, Sweden, Denmark and even to Brazil.

Cotton spinning.

Cotton spinning is one of the most important textile industries in the country. At the present time it employs 902,000 spinning spindles and 256,000 twisting spindles, attended to by a staff of 8000 persons.

This industry is carried on by 50 firms, 10 of which are only concerned with twisting, 8 with spinning alone, and 32 which carry on at the same time, both spinning and twisting.

The Belgian cotton spinning centres are situated in the two provinces of Flanders, Hainaut and Brabant. The city of Ghent alone possesses 20 cotton spinning establishments, which are considered as among the most important.

The Belgian spinning industry utilizes principally American cotton (Louisiana, Texas, &c.), Indian cotton (Bengal, Dollerah, Coconadah, &c.), and Egyptian cotton (Jumel). These cottons are sometimes bought direct from the place where they are grown, but more often in the European markets, chiefly Liverpool, Antwerp, Le Havre, &c.

The production of cotton threads in Belgium has been reckoned at 27 million kilog. (about 240,000 tons). This production includes, for about four-fifths, simple unbleached threads, i. e. those intended for the manufacture of fabrics which are bleached, dyed or printed.

Simple threads. Simple threads for warp and weft are produced from No. 1 to No. 80 A. At the same time, the majority of these threads run from No. 16 to No. 40 A; the rest are composed of thick wefts from No. 1 to N. 16, and, for a smaller part of the fine numbers from No. 40 to No. 80 A.

Bleached threads, are also produced, as well as dyed

threads, printed threads (marbled) which for the greater part are treated by dressers (bleachers and dyers).

Twisted threads. Unbleached threads are twisted with two, three or several ends for weaving, hosiery, ribbon-making, trimmings, &c. By the twisting process, not only ordinary twists are produced, but marbled, curled, spotted, &c.

TOWN-HALL OF GHEENT.

The cotton [spinning industry at the present time is furnished with a plant that will satisfy the needs of the customers of Belgian spinners. It exports, moreover, a part of its products to Holland, Switzerland, Germany, France, England, &c. and principally threads of the coarse numbers (weft). In return, threads of the fine numbers for the needs of the spinning-trade, and in a smaller quantity, for the production of very fine fabrics, are imported from England,

Flax-Spinning.

There are 28 flax and tow spinning mills in Belgium. Most of these mills are situated in the two Flanders; the town of Ghent numbers 17 of them.

Liege, Mechlin, Tournai, Roulers, Courtrai and Lokeren, also possess important tow and flax mills.

The industry of flax-spinning has a working plant of 280,000 spindles, attended to by about 14,000 persons.

Belgium cultivates flax. It produces namely the flax of Courtrai, the best throughout all Europe.

Besides native flax, Dutch, Russian and French flax, &c., are also used.

The Belgian spinning mills produce every variety of linen yarn, from the fine flax of Flanders to the roughest tow, of all numbers from No. 8 to No. 110.

The annual production may be valued at more than 30 million kilogrammes.

More than 60 per cent of this production, especially the thick and medium numbers, are exported to England, who is our principal customer. Then, by order of importance, follow Germany, the Netherlands, Italy, France, Spain, Switzerland.

The finest numbers of flax yarn which are not manufactured are imported. The United Kingdom supplies us with this variety, which Ireland produces in the best conditions, owing to its damp climate.

Briefly flax-spinning is one of Belgium's most flourishing industries. In spite of the heavy duties which these products are submitted to in other countries, Belgian goods have succeeded in maintaining the supremacy on the foreign markets. This supremacy is due to the good quality of the threads manufactured.

Jute Spinning.

This industry distributed in the two Flanders numbers 13 establishments situated in Ghent, Tamise, Lokeren, Roulers and Berlaere.

With a plant of 32,800 spindles and a working population of 1500 to 1600 hands, it transforms annually a quan-

tity of 18 to 19 million kilogrammes of jute and jute-tow, producing from 16 to 17 million kilogrammes of plain unbleached thread.

The raw jute proceeds principally from India. London has almost monopolised the trade of this textile.

Belgium produces jute threads from No. 1 to 18, nevertheless the thick sizes, viz. from 4 to 8, are most manufactured. The finest numbers are made of combed jute, while the most common threads are made of carded jute.

Jute threads are specially used to manufacture packing canvas, sackcloth, matting and strapping fabrics, &c. Jute being easily dyed is also used mixed, with other textiles, for the manufacture of carpets, fabrics for furniture, &c.

The greater part of the Belgian production of jute-threads are consumed in the country. Nevertheless jute threads are exported to the Netherlands, Austria-Hungary, Switzerland, Spain, Germany, &c.

Hemp Spinning.

The mechanical working of hemp, in view of producing thread for weaving and for shoe-making is not much developed in Belgium. This manufacture is principally localised at Lokeren, which contains 3 mechanical hemp spinning mills, comprising 6000 spindles and utilizing 4000 H. P. and 400 hands.

Plain unbleached threads are produced from number 1 to 20. Nevertheless No. 12 in hemp and No. 8 in tow are not often exceeded.

The Belgian production of hemp-thread for weaving and for shoe-making is 1,800,000 kilog. of an average value of 2,500,000 francs.

Thread Industry.

Sewing threads consist in threads of cotton, flax and silk, twisted and dressed in a special manner with the object of giving them a glossy surface, a glazed or unglazed appearance, and thus of facilitating their passage through the material to be made up.

This industry uses, as raw material, threads previously worked in the mill.

The operations to which these threads are subjected are : doubling, twisting, cabling, dyeing or bleaching, pinning, glazing, finally winding into a ball or on a spindle.

The thread industry produces sewing-threads of every kind in flax and in cotton, threads for shoe-making by machinery, threads for lace, threads for knitting, embroidery, &c.

These threads are sold in large or small skeins, wound upon large or small spindles, cards, &c., according as they are intended for manufactures or if they are to be sold by retail.

In Belgium, there are at least 10 thread factories worked by machinery. They are all situated in the two provinces of Flanders, at Alost, Ninove, Comines, Iseghem, &c.

At Alost, there is one of the most important firms, possessing the best plant in Europe for the manufacture of sewing-thread.

ROPE-MAKING INDUSTRY.

Twine-making.

The manufacture of ropes and twine of vegetable fibres is very developed in Belgium. There are about twenty establishments mechanically equipped, for manufacturing twine, cord and rope and occupying more than 900 hands. Besides these mechanical workshops, we may also mention about 500 shops, occupying a thousand persons, in which such articles are manufactured by hand. Finally more than 700 persons, working alone or with an assistant, cooperate to the production.

The rope-making industry is specially established in West Flanders, at Termonde, Hamme and Lokeren. Nevertheless there are very important rope works in the provinces of Hainaut, Brabant and Liege.

As raw material, the rope manufacture utilizes hemp, native grown or imported from Russia and Italy, aloes-fibre, Manilla-hemp, Sunn and coco. Besides hemp, cordage makers also use flax and cotton.

The principal cord-making operations are :—

- 1° Combing;
- 2° Spinning of rope-yarn;
- 3° Tarring the threads;
- 4° Laying of rope-yarns to make strands;
- 5° Union, by twisting the different strands.

Flat ropes are formed by the union of round cords (hawfers) twisted alternately right and left.

Are manufactured in Belgium :—

1° Flat and round ropes for mines and quarries;

2° Round ropes for the navy and for coupling;

3° Cordage for the navy and the construction of buildings;

4° Cords, twines and strings of every description.

Our mechanical rope and twine-making industries produce yearly more than 10 million kilogrammes, valued at 10 to 11 million francs.

SILK INDUSTRY.

Silk Threads.

The industry of silk-throwing, which is so important in France, Switzerland and Italy, does not exist in Belgium, where the rearing of silk-worms has never succeeded.

We are dependent therefore on the foreigners for all thrown silks. Nevertheless, Belgium possesses several twining establishments, which gather together the threads which have been simply thrown, to make threads and twine for sewing and embroidering. If thrown-threads (organzine and weft silk) are not produced, on the other hand, at Ath, « schappe » threads, are manufactured i. e., threads which are drawn from the waste of the silk-worm nurseries and the throwing-mills (floss, flock-silk, damaged cocoons, &c.). These pieces of waste, are treated with boiling water (ungummed) and dried, and then submitted to a sort of combing.

After being combed, the material is placed on a spreading machine which forms a continuous ribbon passing through the drawing frames and the fly-frames. The resulting slub is spun in the throstle-frame. The yarns thus obtained are used for twisting and weaving.

Artificial Silk.

A recently founded establishment, at Tubize, produces artificial silk by the Chardonnet process.

This process consists in dissolving cellulose (cotton and

wood-pulp) in a mixture of nitric and sulphuric acid. The nitric cellulose obtained is then dissolved in a mixture of alcohol and ether; then placed in a receiver subject to high pressure, from which it comes out in the form of little capillary tubes, which solidify under a cooling process. The threads are doubled and thrown; they produce a material resembling thrown silk used in the manufacture of ribbons, trimmings, and certain fabrics, especially fabrics for furniture.

The artificial silk industry is capable of being greatly developed.

Silk Fabrics.

The industry of silk-weaving is comparatively little developed in Belgium.

At Deynze, black silk goods of excellent quality are manufactured. At Forest, the following articles are produced under the most favourable conditions viz : silk goods in plain colours, taffetas, foulards, satins and failles, satinettes for linings, and certain novelties.

Of *schappe* (or spun-silk), are manufactured at Ath, foulards, plain and figured silk goods for shirts, plushes and velvets of the Crefeld type.

Thielt and Ath also produce furniture fabrics in pure or mixed silk.

Statistics. According to the manufacturing census of 1896, the spinning of *schappe*-silk by machinery occupied 60 persons. Artificial silk spinning employs at Tubize nearly 800 persons at the present time. Lastly, nearly 500 weavers, about a hundred of whom work with machinery, are employed in the manufacture of various silk fabrics.

INDUSTRY OF TEXTILE FABRICS.

The manufacture of textile fabrics is one of the most ancient industries in the world.

In the time of Cæsar, flax cloth was already woven in certain parts of our country. Several centuries later, Flemish drapers, especially those of Brussels, Ghent and Louvain manufactured woollen cloth which had a great reputation, and was exported to France, Austria, and even as far as Italy. In the xivth and xvth centuries, there were produced at Brussels, Tournai, Ypres and Audenarde carpets and tapestry of a high warp, specimens of which figure in our museums and bear witness to the taste and skill of the weavers of that period.

Since that time, the Belgian manufacture of textiles has passed through alternate periods of prosperity and depression. In particular, it has changed its place, deserting the ancient manufacturing centres, such as, Brussels and Louvain, to establish itself in other localities and to make a special production of certain articles. It is in this manner that the manufacture of woollen fabrics has more particularly made its home in the Verviers district; that the manufacture of linen has become the special property of the two provinces of Flanders; that the manufacture of cotton goods, keeping Ghent as its centre, has however taken up its abode in other quarters, such as Renaix, Monscron, Braine-l'Alleud, &c.

The last century has besides been marked by inventions which have very greatly changed the weaving industry : we mean the Jacquard machine and the method of weaving by machinery. The first of these inventions has simplified in the most ingenious manner the turning out of

manufactured articles : such as shawls, carpets, damasks, and all other articles requiring the intervention of patterns and colouring; the second has increased in a very large ratio the rapid and elaborate production of every kind of textile fabric.

At the present time, Belgium produces textiles of wool and half-wool, cotton, linen, cloths of mixed linen and cotton; hemp and jute textiles as well as silk and half-silk fabrics.

A. Woollen Fabrics.

Woollen fabrics are divided into three principal classes :

1. Carded fabrics ;
2. Combed fabrics ;
3. Half-wool fabrics.

CARDED FABRICS.

This class includes all fulled fabrics, the surface of which is covered with a more or less apparent down, intended to conceal the grain or draught and tie.

Amongst these fabrics should be noted :—

1. Fine and half-fine stuffs, such as : satins, cachemeres, zephyrs, ladies' cloths, cloths for official dress and livery, military cloths, cloths for carriages, cloths for billiard-tables, &c., &c.;
2. Moskows, beavers, vatteen, and other heavy fabrics for making wearing-apparel ;
3. Novelties in carded wool ;
4. Flannels, flannelettes, friezes, coarse flannels, jerseys, coarse woollen cloths for members of religious orders, special cloths for fishermen ;
5. Felted fabrics for paper manufactories, blankets and horse-covers.

Verviers, Dison, Hodimont, Ensival and Pepinster manufacture specially stuffs, novelties and heavy fabrics for clothing. Saint Nicholas and Eecloo also produce some of these qualities. Fabrics which come under the fourth head are made at Mechlin, Duffel, Herenthals, Gheel, Beaumont, &c. Blankets are made at Mechlin,

LOOM.

Beaumont, Sterrebeek, Sclessin and Louvain, and felted fabrics for paper manufactories at Sclessin and Virginal.

COMBED FABRICS.

Combed fabrics comprise all rash woollen goods, more particularly manufactured in long wool.

They comprise :—

1. Combed woollen goods in black or plain colours, generally figured;
2. Fancy articles in combed fabrics;
3. Cheviots;

These varieties are chiefly employed in the confection of gentlemen's clothes;

4. Light fabrics, of the class of merinos and cachmeres, in plain colours, plain or printed muslins, and certain novelties for ladies.

The Verviers district manufactures specially black combed fabrics and novelties in combed fabrics for gentlemen. Loth and Dinant make a special manufacture of light fabrics for ladies. Cheviots are manufactured in almost all the Belgian woollen centres.

HALF-WOOLLEN FABRICS.

Half-woollen fabrics are produced by a cotton warp and a woollen carded or combed weft.

With carded weft : tweeds, tartans, and trouserings are manufactured. These fabrics are specially made at Renaix, Braine-l'Alleud, Saint Nicholas and Mouscron. Together with carded weft, the flannels called *domets* are also produced by manufacturers who are concerned with pure wool flannels.

With combed weft are manufactured satinettes and serges for linings and zanellas for umbrellas.

These fabrics are manufactured at Loth, Dinant and Alost.

Statistics. Fabrics of pure wool or mixed with cotton, are made in 112 establishments giving employment to 8448 persons and using a motive power of 3179 H. P. These establishments are distributed as follows : 71 in the

OLD CLOTH HALL AT YPRES.

province of Liege, all of which are situated in the Verviers district; 18 in East Flanders; 7 in Brabant; 5 in the province of Namur; 5 in Hainaut; 3 in the province of Antwerp and 3 in West Flanders.

B. Cotton Fabrics.

A great variety of cotton fabrics are manufactured in Belgium. Among these fabrics ought to be mentioned:—

1. Calicoes, long cloths, shirtings and plain stuffs of every description, also packing-cloth;
2. Drills for shirts, drills and stuffs for blinds, sail-cloths, stuff for straps;
3. Flannels, dimities, molletons, moleskins, blankets and dish-cloths;
4. Cottonettes, Vichys, cottonades, fancy spring cloths, buskins, trouserings, &c.;
5. Satins and satinettes for linings;
6. Piqués, dimities, damasks, counterpanes, table-cloths, napkins, shawls, &c.;
7. Cotton velvets;
8. Cretonnes, Indian and other printed fabrics.

The factories of Ghent produce the greater part of these fabrics, but specially plain and figured articles and velvets. Renaix has made a speciality of the manufacture of cottonettes and every kind of fancy material. Saint Nicholas produces especially cottonettes, flannels and shawls. Braine-l'Alleud has kept the manufacture of fine cottonette, and Mouscron that of cottonade. Termonde and Alost manufacture counterpanes in plain cotton, figured counterpanes (Jacquard) and dusters. Lastly, Brussels and Stalle supply all kinds of prints.

Statistics. The mechanical weaving of cotton is carried on in 61 establishments which employ 7921 persons, with a motive power of 4200 H. P. The manufacture of cotton fabrics gives employment to a farther number of 2800 persons working at home. The number of those engaged in weaving in their own homes decreases from year to year.

COTTON LOOM.

C. Flax, Hemp and Jute Fabrics.

FLAX FABRICS.

The weaving of flax has been carried on in Belgium from very remote times.

The cloths produced in Courtrai were famous several centuries ago. In 1810, the manufacturers of Courtrai had more than 3000 looms at work. Since that time that industry has rather decreased in importance in the district; on the other hand it has developed in other places, principally at Ghent, Alost, Roulers, Iseghem, Turnhout, Ruysbroeck, &c.

Different linen fabrics are manufactured under very favourable conditions. Among these may be noticed :—

1. Fine cloths, cambric, lawn, middling cloths, common cloths, cloths for packing, sail-cloths, cloths for tailors;
2. Damasked linen;
3. Tickings for mattresses, tickings for blinds, linen velvets for furniture.

All kinds of white cloths are especially manufactured at Ghent, Courtrai, Iseghem, Alost and Ruysbroeck; cloths for mattresses and blinds are made at Courtrai, Ghent and Turnhout; damasked linen is especially manufactured by two important Belgian firms, at Ruysbroeck and at Ghent.

Lastly, linen velvets are manufactured at Avelghem, and blue cloths are hardly produced now except at Roulers.

D. Mixed linen and cotton Fabrics.

This variety of fabric includes :—

1. Mixed cloths of every kind;
2. Tickings for mattresses and blinds.

These articles are made by the manufacturers who produce the same fabrics in pure linen.

Statistics. Linen-weaving employs 17,600 persons, 7800 of whom are engaged in weaving by machinery. The two provinces of Flanders take the lead, having 40

machine-weaving factories, and 83 hand-loom. These provinces are followed, in order of importance, by the provinces of Antwerp, Brabant and Hainaut.

E. Hemp and Jute Fabrics.

From jute and hemp are made numerous packing-cloths, sack-cloths, tarpaulins, cloths for making linoleum and oil-cloth, cloths for the sails of wind-mills, cloths for watering-pipes and cloths for making the pneumatic tyres of velocipedes.

With a mixture of cotton threads, jute fabrics are also made for furniture fabrics, curtains and hangings. Jute is used for the manufacture of these furniture fabrics on account of its low price and the facility with which it takes the dye.

Hemp and jute fabrics are made at Roulers, Eecloo, Ghent, Tamise, Hamme, &c.

Furniture fabrics in jute and cotton mixed, are made at Courtrai, Deerlyck and Saint Nicholas.

Statistics. This industry gives employment to about 1600 persons, 1300 of whom work with machines and 300 by hand. The mechanical weaving establishments are distributed in the following numbers :—

- 1° 8 in East Flanders ;
- 2° 3 in West Flanders ;
- 3° 2 in Hainaut.

The 7 establishments weaving by hand are distributed in about the same proportion in the same three provinces.

INDUSTRIES FOR BLEACHING, DYEING, PRINTING AND DRESSING TEXTILE FABRICS.

The purpose of these industries is the finishing of yarns and textile fabrics.

Bleaching.

Bleaching is applied specially to yarns and linen and cotton fabrics. In Belgium, it comprises a hundred establishments, thirty of which are only occupied with bleaching; the other manufactories having in addition, either dyeing, dressing, or dyeing and dressing combined.

The greater part of these bleaching factories are situated in the two provinces of Flanders.

Dyeing.

Dyeing is applied to the most different kinds of textile fabrics; it is worked either upon the fabric in flock (wool) or on the thread in the skein, or on the fabric in the piece.

The dyeing speciality includes about 200 establishments, distributed over the two provinces of Flanders and the provinces of Brabant, Antwerp, Namur, Hainaut and Liege.

Dressing.

Dressing consists in operations which vary according to the nature of the fabric.

Although they are very numerous for carded wool fabrics, which have to be fulled, teazled, shaved, sponged and pressed, dressing operations are reduced to about one simple calendering for certain kinds of cotton and linen fabrics.

Belgium possesses a hundred dressing-factories, some of which are annexed to factories of textile fabrics.

Printing.

Belgium possesses a few establishments engaged in the printing of textile fabrics, most of them being situated in the province of Brabant. These establishments work at the same time for the trade and by contract.

The bleaching, dyeing, printing and finishing industries, use a whole series of chemical and other substances, amongst which may be cited :—

1. Chlorine, chlorides and hypochlorites, soda and hyposulphites, lime, ammonia, permanganates, mineral acids, the salts of iron, alumina, copper, chromium, tin, &c.

2. Albumen, gelatine, caseine, starch, fecula, &c.

3. Vegetable colouring matter : indigo, madder, logwood, archil, cochineal, annatto, catechu, &c.

4. Mineral colouring materials, especially those extracted from coal-tar; aniline and alizarine colours, picric acid, saffrons, indulines, &c.

With the exception of artificial colouring materials, which are chiefly imported from Germany, and indigo, logwood, and other dye-stuffs of tropical origin, Belgium supplies at the present time all the commodities employed in the four specialities described above.

BRAIDS AND LACES, RIBBONS, ELASTIC FABRICS, WICKS.

Braids and Laces.

Braids and laces of every kind, cotton, wool, silk and linen, are manufactured in the country.

Among these products may be cited : twist and lace for blinds, pictures; cotton twisted cords for spinning; stay and shoe-laces, &c.; galloons and braids for tailors, braids, &c.

The industry of the manufacture of braids and laces is established at Cureghem, Anderlecht, Hamme and Saint Nicholas.

Ribbons and *laces* in silk and semi-silk are made in the same workshops as braids and laces. An Alost firm has however made a speciality of this manufacture.

Elastic Fabrics.

Elastic fabrics of all kinds, for garters, braces, boots and shoes, &c., are made at Hamme, Saint Nicholas and Deynze.

Wicks.

Plaited wicks for wax and tallow-candles, &c., are made at Saint Nicholas and Wavre.

Plaited lamp-wicks are manufactured at Hal and Saint Nicholas.

Statistics. The industry of the manufacture of braids,

laces and ribbons, is carried on in 6 establishments, giving employment to 1300 persons, with a motive power of 400 H. P.

The manufactories of elastic fabrics, 5 in number, employ a staff of more than 200 persons. They use steam to the extent of 85 H. P.

Wicks are made in 5 establishments occupying about 150 persons and using a motive power of 64 H. P.

LINOLEUM AND OIL-CLOTHS, IMITATION LEATHER, TARPAULINS

Linoleum and Oil-cloths.

Linoleum and oil-cloths are manufactured under the most favourable circumstances at Berchem-by-Antwerp and at Cureghem-Anderlecht.

With regard to linoleum, all kinds are produced, plain or printed, rough or varnished, for floors, stairs, &c.

We manufacture also every kind of oil-cloth : oil-cloth for floors and carpets, for table-covers, table cloths, &c., oil-cloth for furnishing, hangings, trimmings of furniture, chairs, &c. ; oil-cloth for bindings, for carriages and for certain kinds of morocco-work. One factory, situated at Woluwe-Saint Etienne, gives more special attention to waterproof cloth for aprons, children's cots, cloth treated with rubber, oiled silk for invalids, &c.

Imitation Leather Fabrics.

During the last few years there have been manufactured in Belgium, a variety of fabrics called *Pegamoid*, coated with a waterproof compound the foundation of which is celluloid and camphor. By a special process of gauffering, a kind of grain or pattern is obtained, which gives the goods the appearance of kid and other dressed materials, embossed leather, &c.

This product is used for chair covers, for furniture, in the sheath-trade, the carriage-trade, &c.

The Belgian Government use pegamoid for the furnishing of railway-carriages.

Tarpaulins.

For making tarpaulins, caparisons, &c., cloths dressed, in black, brown or green are manufactured.

For this purpose, the following cloths are made use of : flax, hemp and jute, mixed cloths which are covered with a compound the base of which is boiled linseed oil.

Statistics. The manufacture of linoleum and oil-cloth gives employment in Belgium to more than 600 persons, the value of the output being over 5 million francs (£200,000).

The output of pegamoid fabrics is much less important, as this industry only employs some thirty hands.

The manufacture of tarpaulin is more important : it gives employment to nearly 200 hands, and the value of the output varies between 1,500,000 francs (£60,000) and 2 million francs (£80,000).

TRIMMINGS.

This industry comprises three special and distinct branches :—

1. The manufacture of trimmings for furniture;
2. The manufacture of novelties in trimmings for clothing;
3. The manufacture of trimmings for military uniforms.

Trimmings for Furniture.

This special branch is by far the most important. It includes the manufacture of :—

1. Fringes and cords for blinds and curtains, fringes and galloons for furniture, round curtain-cords in wool, cotton and silk;
2. Tassels, cock's combs, macaroons, and all sorts of other little articles covered with thread;
3. Holders for door-curtains, windows, hangings, and all other articles of a more finished kind for the ornamenting of furniture and for chamber-decoration.

Trimmings are either hand or machine-made. For those made by machinery, looms are employed with low and high board, bar-looms specially employed for galloon-weaving, fringe-looms and crochet-looms.

Trimmings for furniture give employment to about a thousand persons.

Their principal center of manufacture is Brussels; but they are also made at Genappe, Loupoigne, Templeuve, Vilvorde, Alost, &c.

Trimmings for Weaving-Apparel.

This speciality comprises a great number of articles for ornamenting ladies' dresses. Among these articles may be mentioned : silk fringes, hair-nets, *appliqués* of all kinds in silk tulle, gauze, velvet, trimmed or not with jet, spangles, &c.

Trimmings for dresses are manufactured at Brussels and Roisin.

Trimmings for Military Uniforms.

This speciality comprises the manufacture of all sorts of ornaments for military uniforms, court and full-dress costumes. It makes use of gold and silver thread, silk and woollen thread, as well as white coopers' work for making pompons, slides, &c.

Galloons of all kinds, braids for epaulets, scarves and cords are machine-made. Pompons, stars, numbers and other small ornaments are hand-made. Trimmings for military uniforms are made at Brussels and Vilvorde.

THE HOSIERY INDUSTRY.

Under this head are comprised all articles of the knitted variety, i. e., a fabric composed of stitches formed by a single thread wound into loops joined one with another.

Hosiery is made in cotton, wool, silk, and a little in flax. It is either hand-made or machine-made.

Machine-made hosiery is made on circular or on rectilinear looms, which have been perfected so as to be able to turn out shaped articles, i. e., contracted or enlarged, under the same conditions as if they were hand made.

For work done at home, small knitting-machines are also used, set in motion by a crank, and specially used for making stockings. These little machines are easily worked by a woman or a girl; they require little attention, and may be worked while the household duties are being seen to.

With the circular loom, there have been manufactured for several years, fabrics in combed wool and carded wool, capable of being dyed and finished in the same manner as other woollen fabrics. These fabrics, which serve for making up over-wear of the *jersey* type, have been almost entirely given up. At the present time a whole series of under-wear of the *normal* type are being manufactured by the same machine. These garments are in combed or carded wool, in vicuna (cotton and wool), in cotton, and in silk (schappe).

In the hosiery line the following articles are made: stockings, socks, over-socks, drawers, vests, shirts, hoods, scarves, gloves, mittens, mufflers, shawls, petticoats, dresses, &c.

The Tournai district, the principal centres of which are Tournai, Peruwelz, and Quevaucamps, has always been

the chief place in Belgium for the manufacture of hosiery.

Nevertheless, for the last twenty years, this industry has been established on a similar footing in the two provinces of Flanders, especially at Alost, Saint Nicholas, Wetteren, &c. Brussels possesses also two hosiery-factories.

Statistics. There are twelve factories in Belgium in which hosiery is made by machinery. These works employ about 500 hands.

Besides these industries carried on by machinery, there are a large number of small manufacturers working at home. They include persons of both sexes who work for shops, and the number of hands so engaged may be estimated at 6000.

MANUFACTURE OF TULLE.

Tulle is a fabric composed of a vertical warp-thread and of two oblique weft-threads, which cross alternately from left to right and from right to left : it is made on a face-frame worked by machinery, the movements of which are most ingenious.

Tulle is worked in cotton-thread, simple or twist and less frequently in silk-thread.

Two Belgian firms at Vilvorde, and Brussels, produce the following varieties of tulle : net and half-net, bobbin, Mechlin, guipure-tulle, mosquito, Greek tulle, spotted-tulle or thousand-flies, net-tulle in silk or half silk.

Machine-made Embroidery.

This industry comprises the manufacture of :—

1. Machine-made embroidery made on a bar-loom and chiefly intended for linen goods ;

2. Embroidery made on a sewing and embroidering machine for articles of furniture and wearing-apparel.

A. *Machine-made embroidery worked on the bar-loom.* This industry has been carried out to some extent in Brussels and at Vilvorde.

The embroideries are worked on a foundation of cotton (cloths, cotton cambrics, tickings, muslins, sattinettes, &c.), on woollen fabrics (cachemeres, ladies' cloths, flannels, &c.), lastly, on silk fabrics (taffetas, satins, muslins, &c.).

The threads for embroidering are twist with several ends, (generally five) of ordinary or special cotton, silk threads, or floss of combed wool.

The articles the most commonly manufactured consist in :—

White embroidery for linen goods.

Coloured embroidery on flannel, satinette, &c., for ornamenting petticoats, dresses, &c.

Finally, embroidery on cloth or cachemere, for dresses and costumes.

B. Machine-made embroidery worked on a sewing and embroidering machine. This industry is chiefly carried on in Brussels and Lierre. There are, however, at Vilvorde, Perck, Elewytt, Lembecq, &c., small embroidery factories using the Cornély machine. Finally, this industry is carried out by persons working at home, for Brussels manufacturers.

This kind of embroidery is principally worked on tulle, white or coloured cloths, muslin, satin, &c.

Embroidery on tulle is intended for the manufacture of curtains, blinds, veils, &c.; embroidery on cloth is used for blinds and other articles of furniture; finally, embroidery on muslin, gauze, satin, &c., is used in the making of draft-screens, covers for tables, arm-chairs, sofas, &c.

THE TANNING INDUSTRY.

Tanning is one of the most interesting industries of the country. It treats not only native skins (more than 700,000 large skins) but it also imports more than 50 million kilogrammes (nearly 45,000 tons) skins of every description, amongst which may be mentioned : ox, horse, buffalo, kid and sheep-skins. These skins dried or salted, are imported chiefly from the Argentine Republic, Uruguay, Brazil, France, Holland, Germany, &c. From Australia and South America we receive sheep-skins tanned but not dressed. We also receive from the same countries, fleeces which are clipped in this country.

The large hides are tanned with oak-bark or the tanning extracts of oak, quebracho, &c.

During the last few years, chrome has also been used for tanning, and excellent results are apparently produced by the new process. Kid and sheep-skins intended for fine leather work are tanned with sumach ; those intended for chamois-leather work are tanned with fish-oil ; finally, dressed hides are tanned with alum and salt, mixed with flour and yolk of egg. Some of the tanning materials employed in tanning properly so called, viz, fine leather work and dressed skins, are produced in Belgium, especially oak-bark and certain extracts. Nevertheless, a good half of the tanning extracts employed are imported.

The following articles are manufactured under the most favourable conditions, viz : leather for soles, smooth leather for slippers, leather for straps, leather for cards, for holed cards, thongs, &c., for spinning purposes.

Sole-leather is manufactured almost all over Belgium. The principal centres of the manufacture of this article however are : Stavelot, Saint Hubert, Laroche, Namur,

Peruwelz and Soignies. Smooth cow-hide is chiefly manufactured in the province of Hainaut.

Strap leather is made at Liege, Verviers, and Herve, and in smaller quantities, at Soignies and Peruwelz. Verviers holds the first place for leather intended for stitching.

Fine leather work is principally manufactured in Brussels. At Saventhem, there is a very important factory for fine leather work, which possesses an excellent plant.

Chamois leather is also made at Brussels and Saventhem.

Lastly, skins for gloves are tanned at Brussels and in the province of Brabant. Patent leather is made at Brussels, Soignies and Assche.

Statistics. The tanneries and curriers, 537 in number, give employment to a total staff of 3829 persons, and utilize a steam power of about 1700 H. P.

The dressing and dyeing of skins and leather are carried on in 43 establishments which employ more than 1100 persons.

Fine leather work and the clipping of sheep-skins give work to more than 1200 persons, distributed among 10 factories, which utilize a steam power of about 500 H. P.

Skins and Furs.

Belgium holds a very respectable place in the finishing of skins and the making up of furs; Brussels is the centre of this little industry.

The principal European markets for skins are London and Leipzig.

In Belgium, all kinds of skins are worked, namely : beaver, otter, marten, sable, lynx, musk-rat, chinchilla, mole, hamster, stone-marten, pole-cat, &c. Lamb-skin (Astrakhan), kid (Thibet and Cashmir), fox, bear, deer-skins, &c. The latter are also used for bedside rugs.

The dressing of skins consists in a number of operations, comprising chiefly : removing flesh, greasing, crushing and suppling, sizing, glossing, &c. Certain skins are also whitened or dyed.

Dressed skins or furs are also assorted, classed, sewn, and treated as cloths, to serve either for the trimming of clothes, or the making of muffs, collarettes, &c.

Hare and Rabbit-Skins.

In the two provinces of Flanders, there is a very important industry which consists in the dressing and dyeing of hare and rabbit-skins. Some years ago these skins used to be dyed black or brown, and sewed principally for making turbans and caps, as well as for the trimming of cheap clothing. At the present time, a very important factory, gives to these goods the appearance and style of real furs (beaver, otter, blue fox, &c.). These imitation furs are in great demand owing to their very low price.

Great quantities of dyed and dressed hare and rabbit-skins are exported.

Statistics. The dressing and making up of skins gives employment to about 700 persons in Belgium. The dressing and dyeing of hare and rabbit-skins employs a rather larger staff of workmen, from 750 to 800.

SHOE-MAKING.

According to the industrial census of 1896, this industry occupied about 40,000 hands. The same year there were only 16 factories manufacturing mechanically.

At present, there are about thirty workshops in which the manufacture is carried out by mechanical processes and these employ more than 2000 hands. This shows sufficiently that for good quality and ordinary quality of foot-gear, mechanical work will supersede hand-work. Fancy boots and shoes alone will remain the exclusive privilege of the hand worker the high-class maker, as the price charged for these articles allows a smaller production and at the same time more expensive workmanship.

Hand-work is still widely practised in the Flanders at Iseghem and Sotteghem; in the province of Antwerp at Lierre; in the province of Hainaut at Binche; finally in the province of Liege, at Herve.

Moreover hand shoe-making is represented in almost every Belgian locality by small masters working by themselves or with one or two workmen.

Mechanical manufacture is carried on in the following centres : Brussels, Verviers, Louvain, Binche, Frameries, Paturages, Termonde, &c. This manufacture is semi-mechanical or entirely mechanical.

For the last few years we possess in Brussels a mechanical manufactory, equipped in the same way as the best mechanical works of the United-States, producing the so-called *american* boots in the best conditions of workmanship and at fair prices.

Boot and shoe manufactories utilise a large quantities of raw material, viz :—

Sole-leather (wild leather), smoothed cow hide, used for soles and heels ;

Sheep-skins dressed and dyed for inner soles;

Vamp leather (heifer), split cow-hide, glossy cow-hide, greased cow, enamelled cow (patent leather) wash leather (calf) dressed and polished calf, calf tanned with chrome or box-calf, enamelled calf (patent), ordinary kid, glazed kid, enamelled kid; bull hide, horse hide, split ox hide, &c. All these kinds of leather are used for making the legs.

Beside these raw-materials which may be called *essential*, this industry uses certain kinds of textiles (ticking, linen, serge, velvet, satin, &c.), buttons, eyelets, laces, buckles, &c.

All kinds of boots are manufactured in Belgium for men, women and children. All these kinds vary according to the fitting, of the soles.

The following soles are made in Belgium :—

- 1° Nailed soles, hand or machine-made;
- 2° Screwed soles;
- 3° Pegged soles (wooden or iron pegs), hand or machine-made;
- 4° Sewn soles, hand or machine-sewn.

The price of the articles most in demand and made in Belgium varies from 9 to 12 francs a pair.: this is the price of laced or buttoned boots for ladies. The good quality boots for ladies and gentlemen, in kid, patent calf, &c., are worth 14 to 18 francs a pair. The fancy articles produced by the high-class makers, are often paid 30 francs and more, a pair. On the other hand children's boots and slippers of common quality are manufactured at fr. 1.25 to fr. 2.25 a pair.

The annual production of this industry is not easy to calculate considering the great number of artisans who work at home. On the contrary, the number of mechanical factories being much more limited, it has been possible to value the production of the latter at an average of 2,200,000 pairs; 1,400,000 pairs of which are ladies boots.

GLOVE MAKING.

Only the leather glove, and more specially the kid glove, is manufactured in Belgium. In this latter specialty Brussels, which is the centre of the Belgian manufacture has acquired a real celebrity. It is principally the kid glove for ladies, called *amadis* glove which Brussels produces to the best advantage both with regard to workmanship and to cheapness.

Independently of this kind of gloves, kid gloves for girls as well as kid gloves and lamb skin gloves for gentlemen, are manufactured in Brussels.

Glove making is one of the industries in which division of labour has been carried to the utmost. This manufacture comprises five principal operations, viz :—

1. *Testing and stretching* the skin, which is done at the master glove-maker's shop;
2. *Cutting* the glove, practised at home by the workman (cutter);
3. *Splitting* the glove, done again at the master's shop;
4. *Sewing* done in the country by sempstresses working at home;
5. *Dressing and finishing*, carried on at the master glove-maker's shop.

Owing to this division of labour, the skill of the Brussels cutters, and the great care bestowed on the sewing by the female workers of the Flanders, Brussels' gloves are not only sold in the country but are exported in very large quantities to England and the United States where they are known under the name of « Brussels Gloves. »

Gloves are sold by the dozen.

Lamb skin gloves are charged from 18 to 28 francs a dozen pairs. Kid gloves fetch from 20 to 60 francs a dozen according to quality, size, and number of buttons.

The Belgian production of gloves may be valued at 325,000 dozen, nearly 300,000 dozen of which are glazed kid for ladies (*amadis*). This production amounts to a value of 9 to 10 million francs.

This industry utilizes native skins, German skins, Dutch skins, &c. These skins are prepared in very good conditions by Belgian dressers and dyers. The Belgian glove manufactories, including the sewing, employ a working staff of 5000 to 6000 hands.

A certain number of Flemish sempstresses work also for German manufacturers. The latter find in Belgium cheap and skilful workmanship which they have not been able to obtain hitherto in Germany.

BASKET WORK.

Basket making is a small industry encountered almost everywhere in Belgium, although it is more developed in West Flanders and Brabant, specially at Maldeghem, Tamise, Brussels, Braine-l'Alleud, &c.

This industry employs about 3800 artisans and utilizes the following raw material :—

- 1° Rotang imported from China and India ;
- 2° Bamboo and rush imported from Japan, China, India, and Brazil ;
- 3° Straw-plaiting imported from China and Japan ;
- 4° Osiers, either native or imported from the Netherlands or Spain.

Basket work is entirely performed by hand.

Both rough and fine basket work is made in Belgium.

Fine basket work. This variety includes : work-hampers and baskets, flower hampers and baskets, linen baskets, wine baskets, toys, cages, cradles large and small, lay-figures for sempstresses, furniture for conservatories, &c., &c.

Rough basket work. This variety includes : hampers of every kind for packing, hampers and baskets for collieries, sieves for gas-works, linen-baskets, hampers for butchers and bakers, pigeon-baskets, hampers for conveying fowls, dogs, &c., baskets for spinning-mills, and dyeworks, hampers for the railway, the navy, and war departments, &c.

The various articles of basket work which are yearly made in Belgium, amount to about 6 million francs.

MANUFACTURE OF BUTTONS.

This industry is carried on in Belgium by four manufacturing all situated in Brussels or the suburbs. With a working staff of about 350 artisans, this industry produces buttons for about 2 million francs.

The following varieties are manufactured in Belgium :—

- (a) Bone, corozzo, horn and cloth buttons for clothing and linen;
 - (b) Metallic buttons for the army, the police, the administration, &c.;
 - (c) Fancy metallic buttons for women and children's clothes;
 - (d) All kinds of buttons for gloves.
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CAOUTCHOUC INDUSTRY.

The caoutchouc trade has taken, since some years, a real importance in Belgium. The Congo Free State, one of the great producers of that precious material, furnishes us now about 6000 tons every year. This caoutchouc arrives through Antwerp, from whence it is sent to all European countries, Canada and United States. In fact Antwerp has become the principal market in the world for this produce.

Thanks to this privileged situation our caoutchouc industry is firmly developing. There are now, in the country, 10 india rubber factories occupying from 1000 to 1200 persons.

Besides the Congo caoutchouc those factories also work the caoutchouc proceeding from Brazil and Central America, from the West Indies, Madagascar, Java, Sumatra, &c.

The products of the india rubber industry can be ranged into two classes :—

- 1° Industrial products ;
- 2° Special articles.

Industrial products : these articles include :—

All kinds of pipes for water, gas, steam, &c. ; india rubber pipes with interposed tissue for breweries, distilleries, &c. ; suction pipes with metallic spirals inside ; pipes in india rubber tissue for fire-engines ; clack-valves, joints, rundles, &c. ; coupling straps ; gas pockets and bags ; waddings and stops for doors and windows ; billard cushions, &c. ; pneumatic pipes, air chambers, full and hollow tyres for cycles, moto cars, coaches, &c. ; stamps, rubbers, stoppers of every kind ; at last, the different

tissues in india rubber as well as the dissolution of caoutchouc.

Special products : these products include :—

Pipes, stoppers for sucking-bottles, nipples, balloons, rings for umbrellas, elastics for boxes, books, &c.

The manufacture of these various products, especially that of industrial products, has grown very important. We may estimate at about 18 million francs the value of the different india rubber articles manufactured in Belgium.

MANUFACTURE OF FURNITURE.

Among the wood industries, the manufacture of furniture has an important place in Belgium.

This industry is carried on in a large number of localities. The provinces in which it is the most prosperous are those of *Brabant*, *Antwerp*, *Hainaut* and *East Flanders*.

Every kind of furniture is manufactured, but certain localities have created specialities. At *Malines*, for instance, is manufactured specially furniture in carved and waxed oak and walnut, chiefly with a view of exportation.

It is also at *Malines*, as well as at *Liege*, that common straw-bottomed or fluted chairs are manufactured.

Ath rivals with *Malines*, but *Ath* is also known for its bent wood furniture.

At *Brussels* and at *Ghent* are manufactured furniture of luxury for drawing, dining and sleeping rooms, in walnut, mahogany and veneered wood.

Brussels especially delivers a great quantity of furniture to the large shops of Paris.

At *Liege* besides straw-bottomed chairs, furniture of luxury is manufactured chiefly in Henry II., Lewis XII. and Lewis XVI. styles and in a special style, very well decorated and worked, called *Renaissance liégeoise*.

Liege and *Brussels* have helped to spread on the continent the taste of the new called, esthetic style.

Tournai is reputed for its veneered wood furniture. The poplar and fir wood furniture for kitchens is manufactured in the neighbourhood of Brussels, and particularly at *Uccle*, *Berchem-Sainte-Agathe*, &c. At *Uccle* is also manufactured the carcass in rather coarsely carved wood, for cheaper furniture.

The industrial census of 1896 shows that there were, in Belgium, at that epoch *1675 manufacturers of furniture and seats, and fine and ordinary cabinet maker's workshops* employing 7200 persons.

But in that number are not included either chair manufactories and workshops, nor chairmakers working at home, nor cabinet-makers and cabinet-carvers working at home for furniture manufacturers.

Here is the distribution, per province, of the 1675 manufactories and workshops :—

PROVINCES.	WORKSHOPS.	NUMBER OF PERSONS EMPLOYED.
Antwerp	264	1753
Brabant	500	2351
West Flanders	164	373
East Flanders	261	797
Hainaut	131	1040
Liege	250	618
Limbouurg	55	101
Luxembourg	16	63
Namur	34	104
	<hr/> 1675	<hr/> 7200

In the province of Antwerp, we number, at Malines alone, 130 manufactories or workshops, several of which are mechanical ones employing 1052 persons.

At Brussels, we also reckon 130 workshops employing 972 persons.

At Ghent, there are 120 workshops, with 418 persons employed.

At Ath, there are only 9 workshops but they employ 798 persons, whilst at Liege, for 113 manufacturers and workshops, there are only 337 persons employed.

The woods most employed are : oak and walnut, chiefly at Malines; at Ath, for the bent wood furniture, they nearly exclusively use beech. For ordinary and painted wood furniture, they use poplar, fir wood and common species.

For furniture of luxury, they employ, besides mahogany, walnut and oak, the rarest species, as : rose-wood, lemon-tree, palisander, cherry-tree, yoke-elm, maple, laurel, pear-tree, &c.

The yearly approximative value of furniture produced can be appreciated at 55 million francs, more than half of which is exported (Malines alone exports for more than 10 million francs).

A few important establishments situated in Brussels, Liege, Ghent and Antwerp, possess next to the mechanical plant for working furniture, a complete plant for making inlaid flooring or French flooring. The fine French flooring, so called marquetry or mosaïc flooring is made with exotic wood in different colours and shades viz : acajou, citron, orange, rose wood, palisander, and violet wood, &c. In this case, the work accomplished is very artistic and is not only used for flooring, but for decorating door pannels, table boards, bed pannels, &c.

In Brussels and Liege, there are a few mechanical workshops in which French flooring is manufactured; they employ about 200 persons.

In Brussels, Liege, Ghent and Bruges, are a few establishments in which furniture and church ornaments are manufactured. In this respect, the Belgian cathedrals and old churches possess several celebrated models of high altars, reredos, stalls, pulpits and rood-lofts.

THE LACE INDUSTRY.

The manufacture of lace is an industry of fancy goods; it is a marvellous art, essentially national for Belgium, where it has been spread for about 500 years.

The lace industry is practised in all the provinces of Belgium with the exception of the province of Liege, but the two provinces of *Flanders* are the principal seat of this industry. On a total of 47,500 lace-makers, West-Flanders numbers 25,500 and East Flanders 18,200. The art of lace-making is still much professed amongst the Flemish populations, who at all times have shown an almost proverbial skill for all kinds of needle work. In certain districts, it may be said that all women, young or old, handle the bobbins or the needle, and where the manufacture of lace has fallen back before the invasion of the great industry, it still possesses a kind of popularity; its remembrance remains alive and little would be needed to regenerate it.

Lace is made *at home* and almost always by women. This work does not require any changes in the dispositions of the house occupied by the lace-maker. Once executed, the lace is handed over to local middle-men, who alone, deal with the lace-maker and who supply the lace to the manufacturers or contractors.

The lace-makers work as a rule, to order and by contract; they are paid « by the job, » they almost all reside in the different villages of Flanders, whilst the manufacturers or contractors reside in the great centres : Ghent, Bruges and specially Brussels.

Lace is divided into *point lace* and *pillow-lace*.

The characteristic feature of *point lace* is the relief and

the set off of the flowers; the ruling character of the *pillow lace* is in the outlines.

Belgium holds the first rank in the manufacture of these two kinds of lace; its lace-makers know how to execute almost every known point.

Point lace is manufactured with the needle only. This lace is composed of tissues made in different scalloped points and all worked with one single thread according to a design supplied by the manufacturer.

Point lace made in Belgium is subdivided into : *Brussels point*, *Brussels application*, *point of Venice* (properly so called), the *Rose point* or *Rosaline point* and the *Burano point*.

Bone or *pillow lace* is made on a cushion or pillow, standing on a trestle, with little spools for guiding the threads and pins for fixing the lace on the pattern. A lace-maker working pillow-lace also uses a quick-matchreel and a spinning wheel to wind the thread on the spools.

If the point lace-maker has as a rule, to display more initiative

FLANDERS POINT CALLED 'TROLLE-KANT', MADE AT MALDEGEM.

than the pillow-lace-maker, it is nevertheless a well known fact, that the practise of working the spools is not easily acquired; the apprenticeship is very long for certain kinds of lace, and sometimes the execution is so full of difficulties, that only specially well endowed lace-makers are able to undertake it.

The following kinds of pillow-lace are executed in Belgium : the *Valenciennes*, *Flanders point* called « *trollekant*, » *Binche lace*, *Mechlin lace*, *Lille point*, *Paris point*, the *Chantilly* or *Grammont lace*, *Bloud* or *Spanish lace*; the *point of England*, *Brussels application*, *torchon lace*, *guipure*, *duchess* and *Bruges lace*, *mixed lace*, and *fancy lace*.

While speaking of lace, a word ought to be said about the industry of embroidery on tulle which is rather closely connected with the lace-industry.

Embroidery on tulle is executed by hand with the needle, the crochet, or on a mechanical frame with the crochet. This industry occupies a few lace-makers in Antwerp, at Maldegheem and specially at Lierre, where it tends to supersede the manufacture of Mechlin lace.

SINT SALVATOR'S CATHEDRAL, BRUGES.

Three essential agents cooperate to the manufacture of lace :—

1° The commercial contractor or manufacturer, who centralizes the production of certain articles for which he has received orders, or the sale of which he foresees and which are almost entirely manufactured outside his premises. He distributes his orders among his middle-men and he very rarely supplies raw material;

2° The middle man, who is placed between the lace-

FLOUNCE IN MECHLIN LACE, MADE AT TURNHOUT.

maker and the commercial contractor, is sometimes an agent, sometimes a convent directed by nuns;

3° The lace-maker working at home.

The Belgian lace intended for exportation is sent to wholesale houses, which in their turn sell it to linen drapers, milliners, dress-makers and sometimes directly to customers.

The competition of Belgian lace with foreign lace need

LILLE POINT, MADE AT SAINT-TROND.

not be much feared, for nothing is produced abroad which is similar to the Belgian articles; but the numerous mechanical imitations, especially of the point of Venice, of Chantilly and of Valenciennes, do a great deal of harm to the Belgian industry.

It is tradition which secures the recruiting of the staff of lace-makers. The mother initiates her daughter to the lace manufacture which she has practised herself from her

FLOUNCE IN VALENCIENNES, MADE AT MENIN.

childhood; but, as a general rule, she no longer teaches her the trade, but sends her to the neighbouring lace-making school where the child is taught to make the lace she prefers. There are in Belgium 160 schools for lace-making and embroidering on tulle, whereof $\frac{3}{4}$ are managed by nuns.

The labour contract between the lace-maker and the middle man is always verbal and often tacite. The remuneration alone is settled and moreover is always established by the middle man, for the manufacturer seldom interferes. The

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by the piece, in a few rare cases she is paid by the day's work.

At the present moment, the lace manufacture is in a period of crisis, and the future of this industry does not appear very bright: events of an economical character, the decrease of real luxury, the fashion, the competition of imitation fabrics and specially the deplorable commercial organisation of the lace industry, have contributed to bring forth this situation.

Nevertheless, on the other hand, the traditional skill of the Flemish and Brabantine lace-makers, the simplicity

of their habits, the reputation and considerable demand for Belgian lace, lead us to hope that our fine artistic industry will succeed in maintaining its ground.

At Bruges, the Gruuthuuse Mansion, restored and arranged for the reception of the municipal collection of antiquities, contains a valuable collection of lace belonging to the town.

LACE-MAKERS AT BRUGES.

PATENTS.

The industrial property is guaranteed by special laws relative to Patents of Invention, to manufacturing and trade Marks, and to industrial Designs and Models.

Patents are now ruled by the Act of the 24th May 1854; they are granted by the Minister of Industry and Labour, without previous examination, at the risk of the applicant, without guarantee, either as to the reality of the novelty, or the merit of the invention.

All questions concerning the validity of Patents are of the exclusive competence of the tribunals.

Patents are subject to an annual and progressive tax, the first being fixed at 10 francs.

From 1854 to 1902 inclusively 110,849 Patents of invention, 39,498 Patents of importation and 18,800 Patents of addition were granted. Total : 171,300.

The amount of taxes for Patents, paid in the course of the same period amounted to more than 12 million francs.

In 1902, there were 6830 Patents delivered, 5858 of which were Patents of Invention, 466 Patents of Importation and 506 Patents of Addition. The same year the Patents produced a receipt of 620,780 francs.

The matter concerning manufacturing and trade Marks is regulated by the law of the 1st April 1879.

The person who first made use of a Mark has alone the right to deposit it. This deposit takes place without examination on the part of the Administration, who has simply to register it. As for Patents, it belongs to the tribunals to appreciate their validity.

From 1879 to 1902 inclusively, there have been 13,489 Marks of this kind deposited and 941 transmitted.

During the year 1902, 803 Marks have been deposited and 49 transmitted.

The price of a deposit amounts to about 31 francs.

Industrial Designs and Models are always regulated, in Belgium, by the articles 14 to 19 of the law of the 18th March 1806. The deposit is secret and often contains several designs. The parcels can only be opened in case of contestation before the Courts, between two or several manufacturers, concerning the property of a design.

The annual tax is 1 franc by deposit for a temporary protection, or 10 francs for a perpetual protection.

The number of deposits effected in 1902 was 212, having produced a receipt of 1727 francs.

All documents concerning Patents, Marks and Designs are collected by the special Service of the Industrial Property attached to the Direction of Industry of the Department of Industry and Labour.

The Administration publishes a collection of Patents giving a short abstract of the invention, and a collection of manufacturing and trade Marks containing the facsimile of the Marks deposited.

Belgium is a party to the International Union for the protection of Industrial Property constituted by the Convention of Paris of the 20th March 1883.

Belgium has also adhered to the Agreement of the 14th April 1891 concerning the international registering of manufacturing and trade Marks.

The conference of the Unionist States met in Brussels in 1897 and 1900, and introduced important modifications in the two precedent agreements. They form the subject of the additional acts of the 14th December 1900.

WEIGHTS AND MEASURES.

The metrical system is in force in Belgium since about a century. Numerous regulations were taken, as well under the French regime as under the Government of the Netherlands, to establish the new system and facilitate its adoption.

After the revolution of 1830, when Belgium became an Independent Kingdom, the law of the 21st August 1816 remained in force until the promulgation of the law of the 1st October 1855.

However, no later than 1848, by the law of the 4th March, the Government had recognized the standards of the metre and of the kilogramme, as sole legal standards.

The weights and measures and weighing machines, new or renovated, are stamped before being offered for sale, or delivered in the trade. The weights and measures presented for assay bear in a distinct and legible manner the name that is given to them in the systematical nomenclature, as well as the name and mark of the manufacturer or seller.

Independently of the above assay the weights and measures are examined periodically.

The territory of Belgium is divided into 18 assay circumscriptions, directed each by a verifier assisted, as the case may be, by one or several assistants. The total number of verifiers is 18, without counting the assistants. This staff is placed under the direction and the superintendence of an inspector belonging to the Central Administration.

Since several years, the Administration has decided to appoint to the office of verifier or assistant-verifier only such candidates, who possess a diploma of high education : such as Doctor of Science or Engineer.

Each assay office is provided, by the care of the Administration, with standards, stamps, and the necessary material of precision.

The standards of the offices, called 3rd rank standards, are compared every two years with the standards of the 2nd rank, which are confronted in their turn, at least every ten years, with the standards of the 1st rank or prototype standards.

The prototype standards were made after the French prototype standards. An office is established at Brussels for the preservation of the standards.

The standard instruments subject to verification are : measures of length, weights, measures of capacity, weighing instruments, casks, and gazometers. A recent law has just determined the legal units of electric measures.

Besides the Service of the assay of weights and measures, there is a consulting Commission to the ability of which, the Minister may apply when a question of principle is to be solved, or when new weighing or measuring machines are to be examined.

There is also a Board charged with studying the application of the new law on electric units.

Lastly, the question of establishing an office of metrology is being examined. The work of this office would be the assay of scales of greater precision, special instruments, thermometers, gauged vases, &c., and electric machines.

Belgium is a member of the International Convention of the Metre, the seat of which is in Paris. The use of the uniform metrical system being the only one authorized in the country, facilitates particularly all interior commercial transactions.

Moreover, the decimal and metrical system being used in most countries, the metre has become, with its derivatives, an invariable international measure, which gives a sure and easy scope to our commercial relations abroad.

MONETARY SYSTEM.

The monetary system at present in force in Belgium is based on the International Convention of 1865 and the additional Act of 1885 which constituted a Monetary Union between Belgium, France, Greece, Italy and Switzerland, concerning the weight, standard, diameter, and currency of their gold and silver coin. The double standard is implicitly maintained in the proportion of 1 to 15 $\frac{1}{2}$.

Gold coins and 5 franc pieces, have the standard of 900 fine, and have illimited legal currency. But the coinage of 5 franc pieces is indefinitely suspended.

Silver change in coins of 50 centimes, 1 franc and 2 francs have the standard of 835 fine. Their stamping reserved to the State, is only allowed within the limits fixed by the monetary conventions. The amount attributed to Belgium is at present 46,800,000 francs. These coins, needed for change, have legal currency among private persons to the amount of 50 francs, but are accepted without limitation of quantity, by the State which has issued them.

Billon money, nickel coins (of 5, 10 and 20 centimes) and copper coins (of 1 and 2 centimes) are exclusively national. They are coined by the State according to the needs of circulation and are exchangeable for payment monies at the public cash-rooms. Nickel money possesses legal currency amongst private persons to the amount of 5 francs for each payment, and copper coins, to that of 2 francs.

It is to be noticed that, in consequence of the indefinite suspension of the coinage of 5 franc pieces, Belgium, like the other States of the Monetary Union, is in fact, with

regard to its exterior commerce, under the system of the single gold standard to which almost all nations have rallied themselves at present. English legislation has offered, for nearly a century, the type of this system. The legal illimited currency belongs only to gold money represented by the Pound Sterling with a standard of 916 fine, and worth fr. 25.22 at the French par. The change coins stamped by the State are of silver and of copper. Their value is nominal and their liberating power is limited.

In 1871 Germany, till then silver monometallist, adopted the gold standard. The coins have the standard of 900 fine. The 20 marks piece is worth fr. 24.69, at the French par. The change coins are of silver, nickel and brass. More recently in 1900, the United States after various changes in the legislation have definitely attributed to the gold dollar the character of monetary unity and of standard. The dollar with a standard of 900 fine is worth fr. 5.18, at the French par. But the silver dollar, which is stamped by the State, at the rate of value compared to gold, of 1 to 1598, has kept its illimited legal currency. In fact, this situation is similar to that of the States of the Latin Union.

Stamping Supervision. In principle, the coinage of gold is free in Belgium, in this sense, that everybody can bring gold material at the exchange of the Mint and request its transformation into 20 franc coins, provide the quantities presented correspond to a stamping of at least 2 million francs.

Contrarily to the system at present adopted in France, England, Germany and most other countries, the stamping of money is not performed by the State. It is intrusted to a contractor who bears the title of « Manager of the manufacture » and operates under the supervision of the Government at the price of a tariff fixed by Royal Decree.

This supervision is exercised by a special Administration directed by a Commissioner of the Mints, under the authority of the Minister of Finances. This officer, judges, according to the law, the standard and weight of the stamped coins, he decides with regard to the standard and the stamp of the ingots and species, the legality of the stamps and dies of the State, the counterfeit coins ;

finally he watches over the execution of the monetary laws and of those relating to the guarantee of gold and silver matters and works.

The Commissioner of the Mints is assisted in the exercise of his office by a Controller of exchange and coinage, an Inspector of Assays and chemical assayers.

Statistics of Belgian coins stamped at the Mint (Hôtel des Monnaies) of Brussels from 1832 to 1904 :—

In gold coins . . . fr.	598,642,745.00
» silver »	560,342,747.95
» nickel »	12,823,558.70
» copper »	8,999,029.93
Total . . fr.	1,180,808,081.58

CREDIT INSTITUTIONS.

On the first rank of Credit Institutions is the National Bank of Belgium, established by an Act of May 5th 1850 and the existence of which has been prorogued, by an Act of March 26th 1900, till the 1st of January 1929; this establishment applies to the discount of bills the greater part of the resources procured by the emission of paper-money, of which it holds the monopoly. The National Bank has a Branch at Antwerp; it has opened discount offices in thirty other towns in the country.

Besides the discount of bills, the National Bank advances money for a short time on the deposit of public funds of the State or guaranteed by the State. It also receive sums on account current; no interest is claimed on these sums.

The Bank has organized a service of deposits without guarantee: by paying a small sum they undertake the care of values of every kind, the receipt of interest, the reinvestment of sums collected, &c.

The following table indicates the situation of the principal accounts at different epochs, with the average rate of discount:—

ON THE 31 st OF DECEMBER	MONEY	BILLS AND ACCEPTATIONS	LOAN	PUBLIC
	IN CASH	(public funds excluded).	ON PUBLIC FUNDS	FUNDS
1860	63,023,535	148,026,291	4,468,872	3,281,312
1870	95,614,523	196,233,878	3,813,330	2,602,286
1880	98,787,206	283,992,826	7,787,090	33,166,186
1890	103,413,340	312,670,661	7,587,900	49,852,104
1898	117,087,292	424,795,032	34,150,000	49,913,427
1900	108,757,109	465,244,299	58,373,083	49,913,427
1902	114,170,310	513,750,490	42,200,825	49,913,427

ON THE 31 st OF DECEMBER	BANK-NOTES IN CIRCULATION	STATEMENT OF ACCOUNT CREDITORS	RESERVE	AVERAGE RATE OF DISCOUNT
1860	117,899,960	81,825,144	5,328,542	3.23
1870	202,528,520	81,319,921	14,708,334	3.38
1880	339,969,510	72,142,896	14,729,929	3.35
1890	404,721,600	67,723,926	22,409,773	3.22
1898	544,652,040	98,975,211	27,074,742	3.04
1900	631,631,800	81,754,197	27,629,794	4.09
1902	676,140,330	78,854,638	29,621,666	3.00

Besides the National Bank, a great many private Banks place considerable capitals at the disposal of the business world. In fact, 1600 million francs were recorded at the assets of the most important of them, on the 31st of December 1902.

A special mention must be reserved to the Credit Unions, the most important of which is that of Brussels, which counted on the 31st of December 1902, 5034 partners. This society does not possess any shares : the capital subscribed is composed almost entirely of the engagements of its members : it constitutes a guarantee fund, each subscriber being responsible to the amount of his subscription. The minimum of the latter is fixed to 500 francs. Credit is opened to the members and the profits as well as the losses are divided between the credited partners, in proportion to the credit that has been opened to them.

Each partner pays, when he is admitted, 5 per cent of the credit that is allowed to him. Each member may dispose of the whole or of a part of the credit allowed to him by presenting a memorandum of discount ; on the amount of every memorandum a small sum is previously deducted, which is carried to the private credit of the partner.

The discount operations of the *Union du Crédit* of Brussels amounted to more than 250 million francs in 1902. The rate is that of the National Bank.

There are also *Unions du Crédit* at Charleroy, Ghent, Liège, Mons, Tournai and Verviers.

The *Popular Banks* (Cooperative Societies) reached the number of 22, on the December 31st 1897; they number altogether 13,341 partners.

The business sum total of the last social year amounted to 309,170,923 francs.

COMMERCIAL COMPANIES AND STOCK-EXCHANGES.

The law of May 18th 1873 recognizes five kinds of properly so called commercial companies :—

Companies in collective name;

Limited partnership (or companies « in commendam »);

Joint-stock companies;

Limited partnership by shares;

Cooperative companies.

The most favourable form for important industrial and commercial undertakings is that of the joint-stock companies which admits the collection of large capitals. In Belgium the form of joint-stock companies has been applied to affairs of secondary importance and it is even sometimes employed to divide more easily the shares in industrial, commercial and financial affairs belonging to a family or to a group of collective partners.

The joint-stock companies are companies of capital in which nobody is bound to more than his share. They are qualified by a particular name or by the designation of the object of the undertaking.

These companies enjoy a great liberty. The law has facilitated their constitution by very simple general conditions which concern : the number of persons who must intervene, seven partners at least are necessary; the creation of the social capital which must be integrally subscribed and of which each share must be liberated of one tenth, either by the means of species given when the company is formed, or by an effective contribution; lastly, the authentic form is required for the act of society.

The joint-stock company is subject to a special publicity, that of the balance-sheet and of the profit and loss account, which must be published in the *Moniteur belge*.

As a sanction of legal formalities, the modificative law of May 22nd 1886 established the responsibility of the founders.

This rule was perhaps too liberal in certain respects and the Government deposited at the House of Representatives on the 25th of February 1904, a bill with the aim of obviating the abuses revealed by experience and of assuring to shareholders and to subscribers a more efficacious security of

THE INNER BOULEVARDS AND THE EXCHANGE, BRUSSELS.

Under the sway of the present legislation, industrial and commercial companies have considerably increased in Belgium.

Statistics indicate the formation of 380 new joint-stock companies in 1900. The number of joint-stock companies existing at that time was 1320, representing a total capital 2,829,192,000 francs, to which must be added 48,491,000 francs, forming the capital of 28 limited partnerships by shares. That is to say altogether 2,878,133,000 francs.

It suffices to read the quotation of the Brussels Exchange

to state the great variety of companies constituted for the most diverse objects. We can, under the form of joint-stock companies, enter into partnership with every kind of industry : every kind of mining, industrial, commercial and financial activity is represented in Belgium among the values which are offered for sale.

Different Belgian companies, whose undertakings are situated in Spain, Russia, Turkey, Egypt, Persia, Far East, Canada, Congo, &c., are daily quoted at the Brussels Exchange. A remarkable number of Belgian companies have been created abroad for the exploitation of transport undertakings. There are more than 50 Belgian tramway companies and secondary and economic railways having their net-work abroad.

There are, in Belgium, eight Stock-Exchanges situated respectively at Antwerp, Bruges, Brussels, Ghent, Liege, Louvain, Ostend and Termonde.

They are regulated by the law of the 30th of December 1867, modified by that of the 11th of June 1883.

The rules of the Stock-Exchange of Brussels, which are decreed by the communal administration, date from the 7th of December 1891. Shares, the capital of which is less than a million francs, cannot be admitted to the quotation of the Exchange.

The profession of stock-broker is free. The committee, decrees, without appeal, their admission to the Exchange. Candidates must be presented by two stock-brokers having professed at least five years at the Brussels Exchange.

A Royal Decree of December 29th 1843 prescribes the publication every week, in the *Moniteur*, of a current-price of public securities, shares and interests, which serves as official basis for the estimation of values, especially for the fixation of rights of succession and mutation by death.

It is the committee of the Brussels Exchange who is charged with the formation of this current-price.

We can have an idea, by following this publication, of the solidity of the Belgian credit the values being always quoted at par or almost at par.

On the 31st of December 1903, the Belgian Government 3 per cent annuity was quoted at fr. 99.72 ; at that date no European State reached that rate.

Markets regulating the price of corn and of agricultural produces number 36.

The average prices are published every month in the *Moniteur*.

All that concerns the public markets belongs to the communal authority.

FOREIGN TRADE.

Belgium, favoured by its geographical situation, furrowed with railroads, streams, canals and rivers, linked to the principal foreign seaports by numerous regular maritime navigation lines, affords every kind of facility to international traffic.

Although still little known, half a century ago, in many countries of Europe, and entirely ignored by the transatlantic nations, without a navy, hardly entered at the present day in the life of colonial expansion, obliged to pass through the medium of buying-agents in order to sell its manufactured goods on the markets beyond the sea, Belgium has nevertheless succeeded,—thanks to its economical equipment and more still to the activity of the population and the confidence its manufacturers inspire—in conquering one of the highest commercial situations of the world.

The *General Table of the Trade of Belgium with foreign countries*, issued yearly by the Department of Finances and Public Works, contains in this respect very useful information.

This table, based on the Custom-House returns, comprises namely the results of *foreign trade* and those of *maritime navigation*.

It contains also interesting notices on the principal seaports of Belgium.

Foreign trade, according to the point of view which it is considered, is general or special.

General trade comprises :—

Under the head of *importation* all goods which, enter Belgium, no matter what their subsequent destination may

THE TOWN-HALL OF ANTWERP.

be, either the bonded storehouses or consumption or transit ;

Under the head of *exportation* all goods which leave the country, no matter where they originate from Belgium or foreign parts.

Special trade includes :—

Under the head of *importation*, all goods declared for inland consumption when imported or when leaving the bonded warehouse ;

Under the head of *exportation*, Belgian goods and nationalised goods, that is to say assimilated to the Belgian goods by the regulations on custom duties, or which, being exempt from these duties, have been, on their entrance, declared for inland consumption.

Certain goods, and among these all which on entering are taxed *ad valorem*, are accounted according to the value declared as well at importation as at exportation and transit.

To find the value of the other wares, the average values called « official values » are resorted to. These official values are every year revised by a special commission instituted by the Minister of Finances and of Public Works. Considering that for their assessment they take into account the very important fluctuations, which happen sometimes from one year to another, in the price of the commodities, it may be asserted that the results published in the *General Table of the Foreign Trade of Belgium* are very near the truth and give a rather accurate idea of the international exchanges of this country.

As will be seen from the following table, the foreign trade of Belgium is of the most active. In constant progression since the constitution of the Kingdom (1830), it has taken, especially during the latter years, an uncommonly quick development.

In order to bring the real importance of this development better forward, the value of the general and of the special trade for each 1000 inhabitants has been computed.

The diagram accompanying this table indicates in a striking manner the progress which has been made.

Diagramm showing the general and special trade of Belgium with the foreign countries. Scale of height : 0^m,001 per 40 million francs.

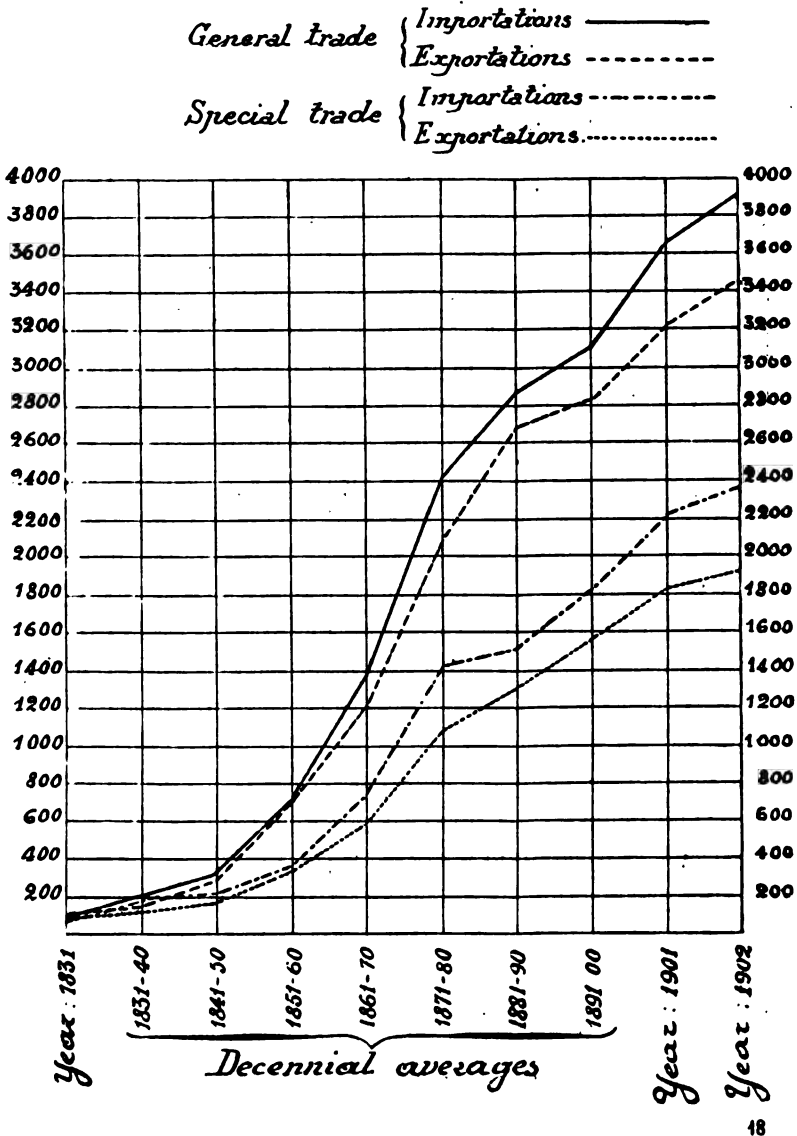


TABLE
INDICATING THE GENERAL AND THE SPECIAL TRADE OF BELGIUM
FROM THE YEAR 1831.

	IMPORTATIONS	EXPORTATIONS	POPULATION	VALUE FOR 1000 INHAB.	
				IMPORT.	EXPORT.
				Fraucs.	Fraucs.
General Trade.					
Year 1831	98,013,079	104,579,786	4,089,553	23,967	25,572
Decennial Periods:					
Average					
1831 to 1840	204,416,849	152,141,304	4,168,856	49,034	36,495
1841 » 1850	336,072,827	283,796,786	4,292,297	78,297	66,118
1851 » 1860	737,393,542	709,018,646	4,586,341	160,780	154,594
1861 » 1870	1,368,249,739	1,219,819,045	4,923,320	277,912	247,764
1871 » 1880	2,413,429,411	2,097,347,094	5,356,480	450,563	391,553
1881 » 1890	2,874,759,068	2,671,583,762	5,867,797	489,921	455,296
1891 » 1900	3,106,701,138	2,839,554,293	6,453,710	481,382	439,988
Year 1901	3,640,645,330	3,239,442,992	6,799,999	535,389	476,389
» 1902	3,939,578,241	3,473,161,027	6,896,079	571,278	503,643
Special Trade.					
Year 1831	89,988,567	96,555,274	4,089,553	2,204	23,610
Decennial Periods:					
Average					
1831 to 1840	180,396,714	128,189,040	4,168,856	43,272	30,749
1841 » 1850	216,826,322	167,165,667	4,292,297	50,515	38,946
1851 » 1860	378,934,049	350,657,405	4,586,341	82,622	76,457
1861 » 1870	741,855,289	596,671,496	4,923,320	150,682	121,493
1871 » 1880	1,413,111,351	1,097,993,658	5,356,480	263,813	204,984
1881 » 1890	1,509,220,191	1,307,104,571	5,867,797	257,204	222,759
1891 » 1900	1,833,683,087	1,568,704,379	6,453,710	284,129	243,070
Year 1901	2,220,991,626	1,828,231,784	6,799,999	326,616	268,858
» 1902	2,380,683,040	1,925,490,170	6,896,079	345,223	279,215

The preceeding figures do not need commentaries, let it merely be noted that starting from the modest figure of the year 1831, 98 million francs for imports and 105 million for exports, the *general trade* of Belgium has reached in 1902 the considerable sum of 3,940 million francs for imports, and 3,473 million francs for exports.

As for the special trade which returned in 1831 the figure of 90 million francs for imports and 97 million francs for exports, it has risen, in 1902, respectively to 2,381 million and 1,925 million francs.

The remarkable difference which is ascertained in the preceeding table, between the figures of the general and those of the special trade, proceeds from the important part which the transit business plays in the general trade.

The following table will allow to appreciate the importance of these transactions.

TRANSIT OF BELGIUM

	VALUES
	Francs
Year 1831	8,024,512
DECENNIAL PERIODS :	
1831 to 1840 average.	23,952,264
1841 » 1850 »	116,631,119
1851 » 1860 »	358,361,241
1861 » 1870 »	623,147,549
1871 » 1880 »	999,353,436
1881 » 1890 »	1,364,479,191
1891 » 1900 »	1,270,849,914
Year 1901	1,411,211,208
» 1902	1,547,670,837

If we compare the special trade, that is to say the trade of Belgium, for the year 1901, with the trade of the principal foreign countries, we can ascertain that Belgium occupies the *first rank* with regard to the value for each thousand inhabitants, and the *fifth rank* with regard to the absolute value.

The results of this comparison are shown in the following table whereof the elements have been drawn from the *Statistical Abstract* published by the Board of Trade of Great Britain.

SPECIAL TRADE (IMPORTS AND EXPORTS COMBINED) IN 1901,
FOR THE PRINCIPAL COUNTRIES

DESIGNATION OF THE COUNTRIES	POPULATION	ABSOLUTE VALUE OF THE SPECIAL TRADE IN 1901 (IMPORTS AND EXPORTS COMBINED)		VALUE of the SPECIAL TRADE per thousand inhabitants	ORDER OF IMPORTANCE	
					According to the value per thousand inhabitants	According to the absolute value
1	2	3	4	5	6	7
Belgium	inhabitants 6,800,000 in 1901	franca 4,049,224,000	franca (*) 4,049,224,000	franca 595,500	1	5
Switzerland . .	3,329 000 June 30th 1901	franca 1,981,685,000	1,981,685,000	595,300	2	9
England	41,459,000 June 30th 1901	pound sterling 869,854,000	21,938,588,000	529,200	3	1
Denmark	2,450,000 in 1901	crowns 689,035,000	957,070,000	390,600	4	12
Norway	2,253,000 June 30th 1901	crowns 431,508,000	599,365,000	266,000	5	13
Sweden	5,175,000 in 1901	crowns 813,171,000	1,129,495,000	218,300	6	11
France	38,962,000 in 1901	franca 8,382,100,000	8,382,100,000	215,100	7	4
Germany (Zoll- verein). . . .	57,086,000 June 30th 1901	marks 9,852,600,000	12,167,961,000	213,200	8	2
United States of America . .	77,647,000 June 1st 1901	dollars 2,256,333,000	11,690,738,000	150,600	9	3
Portugal	5,061,000 in 1901	milreis 86,105,000	482,188,000	95,300	10	14
Italy	32,475,000 Feb. 10th 1901	lire 3,092,947,000	3,092,947,000	95,200	11	8
Spain	18,608 000 in 1900	pesetas 1,665,764,000	1,665,764,000	89,500	12	10
Austria-Hun- gary	45,567,000 in 1901	crowns 3,538,099,000	3,715,004,000	81,500	13	6
Russia	135,000,000 in 1900	roubles 1,312,793,000	3,581,229,000	26,500	14	7

(*) The reduction in francs of the sums indicated in the 3^d column, has been operated at the rate of « par » for gold coins, namely : England fr. 25.221; Denmark, Norway and Sweden fr. 1.389; Germany fr. 1.235; United States of America fr. 5.1813; Portugal fr. 5.60, Italy fr. 1, Spain fr. 1, Austria-Hungary fr. 1.05, and Russia fr. 2.667.

It may be interesting before concluding this account of the foreign trade, to recall to mind the increase which the population of Belgium has shown since 1831, for this increase has not failed to contribute to the development of foreign trade.

In 1831, Belgium possessed a population of 4,089,553 inhabitants and at the end of the year 1902 it numbered 6,896,079 inhabitants, viz. an increase of 2,806,526 or 69.6 per cent. The population of 1902 represents a density of 234 inhabitants by the square kilometre.

Maritime Navigation.

The system of gauging sea-vessels, in force in Belgium since January 1st 1884, is the one known under the name of *Moorsom's*.

The average « ratio » between the tonnage of sea-vessels established according to the rules applied previous to January 1st 1884, and the tonnage of these vessels calculated after the method in force since this date is 1168, or, in other words, 1000 tons of former gauge are equivalent to 856 tons of *Moorsom's* gauge.

The vessels, which coming from foreign lands, ship or unship their cargoes in several Belgian ports, before sailing again, are only once accounted for in the total movement of the navigation as well at the arrival as at the sailing.

The maritime navigation of Belgium has followed the same progression as the movement of foreign trade.

It may be valued from the following table which indicates the general movement (for the whole country) since the year 1831.

GENERAL MOVEMENT OF MARITIME NAVIGATION OF BELGIUM SINCE 1831.

	ENTERED		SAILED OUT	
	NUMBER OF SHIPS	TONNAGE	NUMBER OF SHIPS	TONNAGE
		Tons (*)		Tons (*)
Year 1831 . . .	4,092	126,094	4,047	117,738
Decennial periods :				
Average				
1831 to 1840	4,868	232,057	4,859	232,586
1841 » 1850	2,387	32	2,334	330,603
1851 » 1860	2,789	36	2,793	496,613
1861 » 1870	4,622	18	4,574	1,059,117
1871 » 1880	6,501	17	6,498	2,694,216
1881 » 1890	6,603	2	6,563	4,416,359
1891 » 1900	7,768	18	7,753	7,185,487
Year 1901. . .	8,569	0	8,613	9,340,528
» 1902. . .	8,847	1 0	8,809	10,091,722

It results from the preceeding table that the average tonnage of the sea-going vessels entered in Belgium, which in 1831 was of 115 tons, has reached in 1902 the figure of 1148 tons by vessel.

The proportional part of the Belgian flag in the total movement of the maritime navigation in 1902 at the entrance, has reached 9 per cent. for the number of vessels and 6.6 per cent. for their tonnage, when leaving out the Belgian mailboats of the Ostend-Dover line.

System of Customs.

Importation. Goods imported in the Kingdom are liable to the duties prescribed by the Custom House Tariff.

The Belgian Tariff is moderate; taken as a whole, it assumes a fiscal character, in as much as its general tendency is merely to procure resources to the Treasury. Moreover, wares coming from foreign lands are not all

(*) From the year 1884 tonnage is expressed in tons gauged according to *Moorsom's*.

subject to duties : most of the agricultural products, a great many matters utilized for manufacturing and a great part of the food products are—among many other commodities—free of duties.

Numerous immunities cooperate to soften legislation and allow to attenuate or to suppress the excessive harshness which sometimes would proceed from the levying of custom-duty. These immunities are extended to every department : through exemptions granted in case of change of residence, through facilities shown to travellers, &c. they open the land to foreigners with the largest sense of hospitality; as for the other exemptions of various kinds—concerning agriculture, trade, industry, sciences and arts,—they betoken no less liberal tendencies.

Income duties are calculated according to the declaration the importer has to make of his goods; afterwards the agents of the Administration ascertain by inspecting them, the genuineness of the declaration.

Goods conveyed by railway, whether directly imported by this way or by steamships belonging to a regular service can be directed without any declaration or inspection, towards the public bonded storehouses in connection with the rail-road, where they are deposited in a special storeroom until the party concerned fulfil the required formalities.

Commodities not subject to income duties have also to be declared to the Custom House officers, but the latter limit themselves to a summary inspection in order to ascertain whether the wares are really exempted.

Exportation. Exported goods have also to be declared; but, save for wares entitled to a draw-back on their export, this declaration is only intended to allow the drawing up of foreign trade statistics, for all export duties have been abolished.

Transit. Goods travelling over the territory of the Kingdom are also free of duties; nevertheless, the party concerned has to declare them to the agents of the Administration and to observe the regulations which rule the transit, in order to maintain the regularity of reexportation of the goods.

When the conveyance in transit is exclusively effec-

tuated by railway no other formality is required but to deliver the way-bills, even when the exportation is effected by sea; in this case the goods pass across the Belgian territory in lead-sealed carriages, without being inspected by the officials of the Administration.

Bonded Storehouses. The Act of March 4th 1846, which rules the organization of bonded storehouses in Belgium, defines them as follows : « A bonded storehouse (*entrepôt*) » is a depository for imported goods, which is assimilated » to foreign territory with regard to the indebtedness of » the duties. »

As long as the bonding lasts, the payment of the tax is suspended; the debt is cancelled by re-exportation, and in case of delivery for consumption it becomes only due at the moment the goods are carried out.

There are three kinds of bonded storehouses in Belgium : the public, the private and the fictitious storehouse.

The *public* bonded storehouse is a building used as a depository for imported goods, and affected to this use by the communal authorities. It may be established wherever its usefulness is acknowledged, and is entrusted to the exclusive custody of the Administration.

Are excluded from this storehouse : free goods, live stock, inflammable or dangerous matters, those of which the vicinity may injure other goods, and the products mentioned to this end by the special rules of the establishment. Save these restrictions, commodities of every kind can be deposited in a public bonded storehouse.

The *private* bonded storehouse is a store designated by the party concerned and approved by the Administration to be used as a depository for goods specially admitted to benefit of the favour of such warehouse. It is locked with two keys, one being entrusted to the Administration and the other one to the bonder.

The private storehouse is only granted in localities which possess a public bonded storehouse. Still, for non-manufactured tobacco, private bonded storehouses may also be established in the chief town of a district, in the agglomeration of communes comprising such chief-town and in the chief-towns of cantons which are considered as centres of the manufactory.

At present, no other goods are admitted in private

bonded warehouses than wines, spirits, liquors and non manufactured tobacco.

The *fictitious* bonded storehouse is a warehouse designated by the parties concerned and approved by the Customs Administration to be used as a depository for goods specially admitted to benefit of the favour of such a storehouse. The bonder has its exclusive custody and is compelled to deposit a security for the duties.

The fictitious bonded storehouse can be granted in the same localities as the private storehouse.

As for non manufactured tobacco, exclusively liable to excise duties,—namely foreign tobacco which has already paid income-duties, and home-grown tobacco,—merchants and manufacturers can obtain the concession of a fictitious bonded storehouse in any locality whatsoever, provide the seat of their business or their manufactory be there.

The principal goods admitted into fictitious storehouses are : timber for building and cabinet-making, various half wrought iron wares (rails, bars, tubes, &c.), oats and flower, fruit, and non manufactured tobacco.

Temporary admission and free re-importation.

The Government is authorized to allow, when a security for the duties is deposited, a temporary removal, with total or partial franchise, of goods requiring some workmanship in the country.

By virtue of this regulation, numerous temporary exemptions are granted in very different cases.

On the other hand the Government is authorized also to allow free re-importation of goods sent abroad to undergo some industrial proceedings, when the latter cannot be properly carried out in the country.

Still these authorizations are only granted temporarily, and the import duties fixed by the tariff for each commodity are to be paid eventually on the increase of value weight or volume ascertained at the re-importation or on account of the new tarification resulting from the workmanship.

THE PORT OF ANTWERP.

Port of Antwerp, established on the Scheldt, is the most important harbour of Belgium and even of the European continent, after Hambourg. It is due to these advantages to its geographical situation in the heart of Europe and to the dense populations of Europe on the left bank of a wide and deep river that it gives access to the largest ves-

sels. The river, on the right bank of which extend the town and the maritime installations, is 450 metres wide at high tide and 400 metres at low tide.

When going down the Scheldt towards the sea, at 18 kilometres from the town, the river looks like an arm of the sea. Fixed and floating signal lights, beacons and buoys make navigation easy, by day as well as by night.

Antwerp is 88 kilometres from the sea. This distance can almost be neglected for a vessel coming from other parts of the world, but it acquires a considerable importance for the conveyance

TOWER OF THE CATHEDRAL, ANTWERP.

of commodities by railway or by inland navigation.

The road of Antwerp is certainly one of the most beautiful and of the safest in the world. The landing stages, the area of the wharfs, the sheds, the railways, the freight handling machines, in short the whole equipment make of the harbour of Antwerp, already privileged by its geographical situation, one of the largest and certainly one of the most powerfully equipped in the world. The works that have been undertaken and those that have been projected will make of Antwerp a harbour without equal.

Formerly, the natural road which the Scheldt forms in front of the town, a few jetty-heads protruding in the river, and five or six creeks left dry at low-tide, were sufficient

THE DOCKS, ANTWERP.

to secure for Antwerp an important traffic with the means they could dispose of in those times. The vessels of our forefathers (sailing ships of small size) did not want more.

Their number was sufficient to make up for their deficiency in capacity, and in 1610 Scribanius wrote :—

« I have seen as many as 2500 ships in the Scheldt, of
 » which the last arrived, remained anchored for two or
 » three weeks before they could get near the wharfs and
 » unload their cargoes. On no day were there less than
 » 500 ships entering or leaving the harbour. I have even

» heard that sometimes about 400 sails had been carried
» there at the same time by the tide. »

Every day more than 1000 carriages loaded with goods arrived at the harbour.

The increasing dimensions of the sailing vessels and above all the introduction of steam navigation and conveyance on land by railroads, have imposed considerable modifications to this primitive equipment.

It is at the beginning of the last century that Napoleon I. decreed the construction of floating docks.

GUN OF 120 TONS.

The present harbour is composed of two parts very distinct :—

1° The harbour in the river, bordered by quays, with wide platforms on a total length of 5500 metres, more specially affected to regular lines of steam navigation. An outer wharf (300 m. long) in prolongation of the quays is intended for the petroleum trade ;

2° The inside harbour, composed of wet docks which are divided into maritime and barge docks.

The wet docks, after the finishing of the two new docks in course of construction, will have a total area of 92,3 hectares, 10,000 metres of quay-walls and 2120 metres of continuous timber framed wharfs.

Docks.

The docks of the harbour are floating docks. There are now, on the North, eight great docks communicating with the Scheldt by two locks having at ordinary high-tide a depth of 6 m. 89 and 7 m. 43.

The two first docks are the Napoleon's dock and the Willem's dock, constructed at the beginning of the last century.

The *Napoleon's dock* communicates with the Scheldt through a lock-head, 18 metres wide. It is 173 metres long and 145 metres wide. It is separated from the Willem's dock by another lock-head, of the same width than the first. It is then a real half-tide dock or a large lock-chamber.

The *Willem's dock* is much larger than the former. It is 378 metres long and 155 metres wide.

Between the two docks rose the Hanseatic House, construction erected in 1564 and destroyed by fire in 1893. It was then used as a grain store with silos.

SHEERS LOADING THE SAME GUN.

At the end of the Willem's dock is the Royal Entrepot (bounded warehouse), large five-stories building, fitted with cranes and electric lifts.

The wharfs of that dock are supplied with pyramid cranes.

The *Kattendyck dock*, which has been built in 1860, has now an area of 960 m. \times 140 m. It is connected with the

Scheldt through a lock 24 m. 80 wide with a lock-basin. On the lock-head, towards the Scheldt, are two enormous rolling bridges, actuated by water under pressure.

The Kattendyck dock is connected at one end with the Willem's dock and at the other end with the Lefebvre dock. It is also connected with six graving-docks, the longest of which is able to accomodate ships 155 metres long.

On the East side are to be noticed hydraulic sheers of 120 tons capacity and two 40 ton cranes, also actuated by hydraulic power.

With the afore mentioned dock is connected the « *Bassin au Bois* » (*Timber dock*) surrounded with sheds for temporary depositings. Its banks are sloping and lined with stones. This dock is 520 metres long and 150 metres large.

With the Timber dock are connected :—

1° The *Campine dock* measuring 370 m. \times 175 m. The East side, which is specially reserved to the ore traffic, is fitted with hydraulic cranes of the *portico*-type. On the South wharf is established an automatic rocker (coal-hoist) intended for loading coal. It can lift a car weighing with its load 25 tons, raise it a height of 12 metres and pour its contents in the ships by means of a sliding board.

2° The *Asia dock* of an area of 740 m. \times 95 m. Its North side is used for the timber traffic and its

DRY DOCK.

East side for ore, especially zinc-ore.

On the North of the Kattendyck dock is the *Lefebvre's dock*, of a polygonal shape, built in 1887. Its wharfs are provided with sheds and hydraulic cranes. On the South side is a crane of 10 tons for the unloading of cabinet-wood, and a large building with silos and mechanical appliances for warehousing grain. It is able to accommodate 350,000 hectolitres.

With Lefebvre's dock is connected *America dock* affected to the petroleum trade. The greater part of this traffic is

carried on in vrac and the warehousing is performed in tanks surrounding this dock. They are 35 in number and have a capacity of 67,060,000 litres. We must mention also four groups of warehouses to stow the casks.

There are at the docks 64 movable hydraulic cranes besides stationary cranes of great power.

These cranes and the capstans used to manœuvre the ships, the swing-bridges, and the lock-gates, are actuated by water at a pressure of 50 « atmosphères. »

The forcing machinery is in a special building near the big sheers.

The area of the sheds of the eight maritime docks is

PETROLEUM TANKS.

162,947 square metres, the total length of wharfs is 10,950 metres.

The towing of ships in the docks is performed by means of ten steamtugs of different sizes and types.

Four of them are especially built to break the ice in the docks during severe winters. To this effect they are loaded abaft to make the bow emerge and break the ice by the weight of the tug.

In order to maintain the depth of the docks and lock-channels, the town possesses two dredging-ships (of the

bucket-type); one of them is provided with a strong pump suitable for assistance in case of fire. The spoil is carried far away by two carrying ships with bottom valves, actuated by steam and with screw propellers.

The inland navigation is very important. It occupies almost all the docks and even partially obstructs them with lighters, among which some are floating stores. There are generally 250 sea-vessels on an average and more than 1200 canal barges lying in the harbour.

Souths of the town, three docks are especially reserved to inland navigation. The central one communicates

EAST QUAY OF THE CAMPINE DOCK.

with the Scheldt through a sas-lock of 13 metres aperture. It is especially used by the small lines of regular navigation. The South dock is reserved to the unloading of bricks and to the loading of the town refuse. The North dock is more especially used for the coal and beer traffic.

Wharfs at the Scheldt.

In consequence of a special convention between the state and the town, a quay 5500 metres long has been cons-

tructed along the Scheldt. The State has erected the wall and the town has supplied the sheds, the equipment, &c. The water depth along the wharfwall is 8 metres at low-tide and 12 m. 20 at high-tide. The average amplitude of the tide is 4 m. 20 and the edge of the wharf is 2 m. 60 above the average high-water level. The whole is managed by the town and the net profits are divided in proportion to the respective outlays.

In the central part, in front of the town, there is a floating landing stage 100 metres long by 20 metres wide, fitted with a movable bridge and intended for the ferry boat service and other passengers' boats.

Along these quays there are metallic sheds and 123 hydraulic cranes of the *portico* type, are running between these sheds and the river. Their power is from 1500 to 2000 kilograms. There are, besides, 45 semi-portico cranes in course of construction.

Between the sheds and the edge of the wall are one, two or three rail-

SOUTH HYDRAULIC WORKS.

way tracks for direct transshipment. Behind the line of sheds there run three tracks for the loading and unloading, and two for circulation. In the South part of the wharfs, on about 1400 metres length, the tracks for loading and unloading are 8 in number.

The whole is separated by an iron railing from the paved street bordering the wharfs.

Terraces with inclined planes and stairs for access are

established on the top of a part of the sheds and allow to enjoy the sight of the river. The traffic is carried on below.

In the central part, in front of the town, stand out against the sky the embrasures of an old fortress, the *Steen*, that has been preserved and restored. It contains a museum.

The sheds of the Scheldt wharfs cover 177,500 square metres.

The cranes are actuated by hydraulic power. The water is forced under a pressure of 50 atmospheres by a machinery which includes two engines of 250 H. P. each.

Capstans actuated by electricity, are used to move the cars and to bring them by means of transporters on the tracks along the edge of the wharfs.

Upwards of the Scheldt wharfs the town has bought and appropriated the necessary grounds for the new installation for the petroleum traffic. A pier of armed beton resting on fourteen piles driven with compressed air, is used as a landing stage for ships. Thence five large pipes of 300 $\frac{m}{m}$ are carrying the mineral oils towards large low grounds; these grounds are divided into lots (where those whom the matter concerns have to build their own tanks), and they are provided with macadamized roads and numerous railway tracks.

Stations.

The stations used for the freight traffic are the combined stations of Antwerp-Docks and that of Antwerp-South.

In the station of Antwerp-Docks and in its annexes are 46 hydraulic machines for loading and unloading the cars.

There are more than 30 capstans for hauling the cars and manœuvring them on the turning plates.

The average daily traffic at this station is of 3000 cars; at Antwerp-South it is of 1200 cars.

Shipping trade of the port.

The port of Antwerp is frequented by 144 regular lines of steam navigation, of which 101 have Antwerp as head

quarters, and 43 as touching harbour, independently of a great number of regular lines of sailing navigation.

The shipping of the harbour, has taken, in the last years, a great development. The following tables will show it :—

Maritime navigation. Tonnage of sea-ships entered :—

1890	4,600,914 tons	Moorsom.
1891	4,766,204	»
1892	4,605,604	»
1893	4,780,130	»
1894	5,100,767	»
1895	5,461,154	»
1896	5,957,748	»
1897	6,315,920	»
1898	6,509,474	»
1899	6,842,163	»
1900	6,691,791	»
1901	7,510,988	»
1902	8,427,779	»
1903 (11 months)	8,367,171	»

Inland navigation. Tonnage of inland-vessels entered :—

1890	2,774,586 tons of 1000 kil.
1891	3,071,577
1892	3,152,703
1893	3,140,878
1894	3,447,712
1895	3,536,528
1896	4,102,654
1897	4,241,346
1898	4,858,058
1899	4,887,599
1900	4,994,247
1901	5,238,645
1902	5,705,731

The installations described above, in spite of their large extent, are unable to accomodate a traffic of such an intensity.

Therefore it is foreseen that besides the works in progress, the continual increase of the commercial movement will require new works; especially the regular lines of navigation will require wharfs on the river much beyond what exists to day.

They are therefore studying projects for a still larger extension.

It has been proposed to modify the course of the Scheldt below Antwerp, by replacing a meandering course a

little defective for navigation by a more regular and straight one. The new line should cut through the grounds on the right bank. This project has raised eager discussions and Belgian and foreign engineers have been called to give their opinion on the subject.

Whatever may be the solution adopted, we may be sure that the Belgian government and the city of Antwerp, will, for the sake of honour, do all that it is possible to keep the port of Antwerp in a condition equal to the modern requirements, and to secure for it an ever increasing prosperity.

THE PORT OF GHENT.

The town of Ghent is situated on the confluence of the rivers Lys and Scheldt; it is an essentially industrial town. Its spinning and weaving mills (cotton, linen and jute) are celebrated. Horticulture is greatly developed there. Its population (town and suburbs) amounted on the 31st of December 1902, to 202,099 inhabitants.

The Scheldt not being navigable as far as Ghent for the ships of a great tonnage, this town has been connected with the North sea by a large size ship canal running from Ghent to Terneuzen, a Dutch town situated on the left bank of the Scheldt, 15 miles from its mouth.

Furthermore the harbour of Ghent communicates, by the Scheldt, the Lys and numerous interior canals with the most part of the chief towns of Belgium and of Northern France. A very complete net-work of navigable-ways and railways, radiating in every direction assures the transport of goods in the most economical and rapid conditions.

Ship-Canal from Ghent to Terneuzen.

The canal from Ghent to Terneuzen was inaugurated in 1827, it was divided into two separate reaches by the lock at Sas-de-Gand, with a fall of 0.45 metre. At its extremity it communicates with the Scheldt by two locks, now still in existence, which have respectively an opening of 8 and 12 metres. The lock of Muide which separated the harbour properly called from the canal, has since been suppressed. There has also been dug on the East side of Sas-de-Gand a derivation provided with a new lock.

The water section of the canal has now the following dimensions :—

Width at the bottom : 17.00 metres;

Width at the water-line : 56.00 metres;

Depth under the water-line : 6.50 metres.

They have just undertaken a new series of works for the improvement of the canal. These works have for object to create at Terneuzen a new channel of access 800 metres long and 7 m. 39 deep at low-tide, with a maritime lock 18 metres wide and 140 metres long; to unify the level of the water-line in the Belgian and Dutch sections of the canal; to dig on the East side of Sas-de-Gand a new derivation which will be provided with a great lock 200 metres long and 26 metres wide, destined to remain open in ordinary times; to straighten certain parts of the canal the sharp curves of which embarrass navigation; to rebuild all the bridges with an opening of 24 metres; finally, to increase considerably the width and the depth of the canal.

When these works are finished the canal from Ghent to Terneuzen will consist of a single reach 33 kilometres long, 24 metres wide at the bottom, 66 metres wide at the water-line and with a depth of 8 m. 75 under the waterlevel.

The maritime road thus improved will make Ghent an important center of international shipping trade.

Harbour.

The harbour of Ghent includes four docks of a total area of 30 hectares. They are : the « Bassin du Commerce » (Trade-Dock), the « Bassin au Bois » (Timber-Dock, the *Tolhuis*-Dock, and the outer-harbour. The town is now making a new dock which will be connected with five oblique subsidiary docks.

The total area of these docks, together with that of the manœuvring basin which will connect it with the canal of Ghent to Terneuzen, will be 85 hectares.

After the completion of these new docks the total length of loading and unloading wharfs will be 6,505 metres, that of the banks suitable for landing will be 7,860 metres.

There are sheds, two story warehouses, a public entrepot with four stories, moving steam cranes, and two dry docks.

The present equipment of the port must be considered as temporary : it is destined to be replaced by an installation of central power actuating at a distance the freight handling machinery. A competition is now open with a view to this improvement.

Shipping trade of the Port.

The of Ghent is in direct relations with England, Scotland, Ireland, Sweden and Holland by means of regular services of steam navigation.

The following table gives the number and the net tonnage, in Moorsom's tons, of the vessels which have entered the harbour of Ghent during the years 1885 to 1902 :—

YEARS	ENTERED SHIPS					
	SAILING		STEAM		TOTAL	
	Number	Tonnage	Number	Tonnage	Number	Tonnage
1885	110	26,386	693	254,625	803	281,011
1886	76	17,061	665	279,401	741	276,462
1887	68	19,740	749	324,485	817	344,225
1888	117	38,541	669	321,828	786	360,379
1889	121	33,936	749	365,145	870	399,081
1890	126	33,011	818	395,754	944	428,795
1891	112	34,632	901	462,196	1,013	496,828
1892	130	38,095	842	461,757	972	499,852
1893	127	30,193	785	448,010	912	478,233
1894	90	29,748	800	474,932	890	504,680
1895	84	27,372	773	481,518	857	508,890
1896	109	37,769	828	530,158	937	567,927
1897	107	36,965	873	567,519	980	604,514
1898	113	34,553	882	598,018	995	632,571
1899	98	28,901	844	588,360	942	617,261
1900	140	33,275	974	663,470	1,114	696,745
1901	98	27,398	1,009	688,773	1,107	716,171
1902	99	26,285	963	667,863	1,062	694,148

The net tonnage per entered ship, which was 350 tons in 1885, reached 654 tons in 1902.

PORT OF BRUSSELS.

The Present Canal.

The present canal of Willebroeck was built in the xvith century. It was the work of Jean de Locquenghien, burgomaster and amman of Brussels, who drew the plans and conducted their execution.

THE LEOPOLD'S BRIDGE, BRUSSELS.

It begins at Brussels, at the Leopold's bridge, where it communicates with the canal of Charleroy. It reaches the Ruppel, opposite Boom, at 4.5 kilometres from the mouth of this river in the Scheldt.

Its length is 28 kilometres; its present anchoring depth

is 3 m. 20; its width at the water-line varies from 22 to 55 metres. It is composed of five reaches separated by four locks, without counting the lock which gives access to the Ruppel at Petit Willebroeck.

The docks, five in number, are situated at Brussels.

The New Canal.

Important works of enlargement and deepening are now being executed.

A joint stock company, the shareholders of which are the State, the province of Brabant, the town of Brussels, the suburbs of Molenbeek-Saint-Jean, Schaerbeek, Saint-Gilles, Anderlecht, Saint Josse-ten-Noode, Ixelles, Koelberg, Etterbeek, Laeken and the town of Vilvorde, was constituted on the 13th of June 1896, for a duration of ninety years.

That company has for object :—

1° The purchase of the present canal with all its dependences;

2° The transformation of the canal into a ship canal;

3° The construction of a maritime harbour with all its accessories : dry-docks, entrepôts, docks, wharfs, warehouses, elevators, sheds, cranes, &c.;

4° The working of the canal, the port and their dependences;

5° The working of the existing docks, property of the town of Brussels.

The canal will be transformed with a view to serve, besides the existing inland navigation, the maritime traffic of coasting. Its definitive depth of water will be 6 m. 50 with a minimum width at the bottom of 20 metres. The width at the water-line will vary from 40 to 60 metres in the normal course and from 70 to 100 metres at the stations.

The banks will be protected by masoned facings and in the agglomerations these facings will be replaced by quays.

The locks, the number of which will be reduced to three, will be located : the first at Capelle-au-Bois, the second at Willebroeck and the third at the Ruppel. They will be 16 metres wide, with a useful length of 144 metres and a water depth of 7 m. 50 on the mitre-sills.

The movable bridges will leave a passage of at least

18 metres of opening. Those at Laeken, Vilvorde, Grimbergen, Humbeck, Cappelle-au-Bois, Thisselt and Willebroeck which give passage to roads, will be of the double bascule type, opening in the middle. The road-bridge of Petit-Willebroeck will be a swing-bridge as well as the railway-bridges of Laeken, Cappelle-au-Bois, Grand-Willebroeck, Ruysbroeck and the mixed bridge of the Avenue Van Praet.

The free height will be 6 m. 50 under the railway bridges at Laeken and at Cappelle-au-Bois, and 4 metres under the railway-bridge at Ruysbroeck and under the road-bridges at Laeken, Cappelle-an-Bois, and Ruysbroeck.

The new canal will leave the old one below Willebroeck, in order to follow the Ruppel and to run into that river below the railway-bridge of Boom in a concave shore, naturally bordered with greater depths. This new course of the canal will be 3.5 kilometres long and 48 metres wide at the bottom; the bridges will offer a double passage. It will constitute a vast siding bordered by grounds belonging to the Company and admirably suitable for the creation of industrial works.

The interior harbour.

They are building a first harbour in the plains of Tour and Taxis, near the centre of the Brussels agglomeration and the existing commercial and industrial establishments. It is what may be called the interior or local harbour; it will be chiefly affected to the movement of small coasting and to the traffic of large inland barges.

The harbour of Tour and Taxis will include a dock of 900 metres in length, 120 metres in width and 5 m. 50 in depth of water. Its area will be 11 1/2 hectares and it will offer about 1700 metres of useful wharfs bordered with platforms of a width of 53 and 75 metres. These platforms will be provided with sheds, and supplied with railways with cranes and elevators.

This harbour is established in a parallel line to two large ways: the first, *l'Allée-Verte*, will be 52 metres broad; the second, called *Avenue Nouvelle*, will be 30 metres broad and will separate the harbour from the large freight-station of Tour and Taxis. This station will

include an area of more than 30 hectares and will be able to accomodate a daily traffic of 800 cars.

The new public entrepot, the custom house and the railway offices, will be established inside of this station, near the docks and the town.

The maritime dock of Tour and Taxis will be connected with the canal of Charleroy by another dock which will be especially affected to the inland navigation, and will have a length of 700 metres and an average width of 42.50 metres. The wharfs of this dock will be provided with railways and cranes.

Finally, the portion of the present canal comprised between the « Bassin de la Voirie » and the first bridge at Laeken, will be kept and arranged so as to form a second dock for inland navigation 615 metres long and 315 metres wide.

The greater part of the old docks will be filled up, as well as the portion of the present canal comprised between the Leopold's bridge or the *Porte du Rivage* and the « Bassin de la Voirie ». Wide roads will be made, which will reach the fixed bridges over the canal of Charleroy, by gentle inclined planes, thus realizing the direct junction of the *boulevard d'Anvers* and the *boulevard Leopold II*.

The Outer-Harbour.

An outer-harbour is projected below Laeken in the plaines of Mon Plaisir, against the station of Schaerbeek; this exterior harbour will be kept in the future for great coasting and for transit navigation.

It will be 6 m. 50 in depth of water, 110 metres in width and have 2000 metres of wharfs on the right bank accessible to ships. These wharfs will be fitted up in the manner of modern harbours and will be bordered by a platform of 110 metres of useful width, which will be served by the formation station of Schaerbeek.

In awaiting the complete realization of the outer-harbour, the proposed docks and wharfs will be executed on the left bank, together with a dry dock and contiguous buildings for the towing service, with workshops for repairs, &c.

THE PORT OF OSTEND.

The town of Ostend is situated on the North Sea. Its population amounted on the 31st of December 1902 to 41,134 inhabitants.

On the site of the former fortifications, the demolition of which was finished in 1876, as well as on the surrounding grounds, chiefly along the coast, a new and elegant town was made which is continually extending. Ostend is now one of the most important watering-places in the world. Every year more than 130,000 visitors resort to this town.

The origin of the harbour dates from 1445. In that year Philippe-le-Bon authorized the inhabitants of Ostend to dig across the dam, which protected the town from the assaults of the sea, a haven to be used as a refuge for fishing boats, the only crafts visiting the coast at that epoch. This haven was open on the West side; it was not very deep and its access was difficult and dangerous; it was abandoned about the year 1600.

THE BEACON, OSTEND.

In 1550 the town was surrounded with fortifications and the downs situated at the East were levelled in order to establish them. The sea soon

found a passage on this side and submerged at every high tide the surrounding flat country. Under the action of the flow and ebb tides the new outlet was rapidly enlarged ; it is from that epoch that the present channel of the harbour dates.

Owing to the great extent of the creeks and of the low grounds covered by the tide above the harbour and into which the fresh waters flowed from the surrounding grounds, the new channel became very deep : About the year 1700 the depth reached from 40 to 50 feet on the inside and 30 feet on the outside part of the channel ; on the bar situated before the entrance from 4 to 5 feet were sounded. These depths decreased afterwards on account of the successive damming up which caused the disappearance of the submersed areas ; about 1800, the entrance of the harbour had become very narrow and had hardly more than 2 or 3 feet of water at low tide.

Since that time the natural flushing produced by the introduction of the tide in the low grounds above the harbour was replaced by artificial sweeping with flush basins and sluices.

Present condition of the Port.

The exterior channel to the harbour of Ostend is about 450 metres long ; it is included between two laticed framed piers with low stone dams, running approximately towards the North-West ; it is 100 metres wide at the narrowest part and 150 metres at the entrance.

The interior channel leads to the outer harbour and communicates on the West with the stranding dock for the fishing boats, which is surrounded by masoned quay walls. Immediately towards the South is found the mooring place of the State packet-boats plying to London and of those of the new line of Ostend-Tilbury. Further up and on the same side is the wharf reserved for the State mail packet-boats doing the service between Ostend and Dover.

Then the channel leads to the lock of the wet docks, three in number, which stretch behind the town one after the other ; they have a total area of 5 hectares and are surrounded by 1150 metres of quays.

The first dock, immediately above the lock, communicates with the derivation of the Bruges-Ostend Canal which branches out from this canal at the bridge of the *Chapelle* (Chapel's bridge) at Slykens.

In 1887, the outer harbour was dredged out to 4 metres under the level of low water. There was even a ditch of 180 metres by 60 metres formed, where they sounded as much as 7 and 8 metres of water at low tide. There the boats of a great draught remain on their arrival and await a favourable tide to enter the docks after having lightened if necessary.

The conditions of access to the harbour of Ostend were still depending a few years ago on the presence of the « *Stroombank* » which separates the great and the small

CHAPEL'S BRIDGE AT SLYKENS.

roads of the harbour; an average depth of from 2 m. 50 to 3 metres was sounded thereon at low tide. But the situation was modified by the digging of the so called « *West Pass* » effected in 1890 and 1891 across this bank. This pass is buoyed by two lights of direction established in the downs at about 1800 metres to the West of the steeple of Mariakerke. They sounded there an average of 6 metres of water at low tide.

In consequence of the good result attained by this work, as regards the access of the harbour, a second one, said « *direct pass* », has been dredged to the West-North-West of the entrance of the channel in line with the great lighthouse and the green light established on the North

pier of the harbour. The depth at low water is there from 5 to 6 metres. This pass is preferred by navigators to the West pass, which is no more used now.

A third pass—the East pass—has been dug to separate from the coast the « Stroombank », which was rooted in it near Wenduïne, and to help thus the circulation of the streams in the small road with a view to maintain the depths. 5 m. 50 is the minimum depth in this pass.

New Installations.

The port will receive a very important extension by the new installations which are being built and which will be in operation in the course of 1904. They include

BRIDGE OVER THE OUTER-PORT.

the creation of a new outer port, in the place of the present back port.

On the West shore there will be built a quay wall with 8 metres depth of water at low tide, while the opposite bank will be protected by masoned facings, supporting frame stages for the mooring of the State Mail packet-boats. The quay wall, about 800 metres long, will be united, upwards, to the masonry of the projected bridge over the new outer port. This bridge will give passage to a roadway, to a double railway (destined to connect the tracks established on the two banks for the service of

the harbour and of the Navy) and to the tracks of a narrow gauge railway or tramway.

A wet dock preceded towards the sea by a lock of 18 metres width and 120 metres of useful length, is now being built. This dock is followed by a canal-dock and a manœuvring dock in direct connexion with the derivation of the canal from Ostend to Bruges. The canal-dock and the manœuvring dock are especially destined for the importation of timber from the North, with a view to which the banks are covered by masoned facings and supplied with timber wharfs.

The channel of access to the lock, properly widened towards the axis of the outer port, will be bordered with

BRIDGE ON THE SLUICE.

masoned facings and frame guiding piers. Two swing bridges will be built on the sluice to give passage to the tramway line from Ostend to Blankenberg and to the road from Ostend to Bruges.

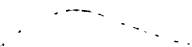
A formation station will be made and connected with the existing tracks on the left bank of the derivation of the canal from Bruges to Ostend.

Inside of the maritime works the State railway administration, for their part, pursue actively the realization of important improvements to the service of Ostend-Dover and to that of the international express trains starting from Ostend. They have established since 1896 a new

line forming a direct junction to the « Ostend-Quay » station.

The present building of the maritime station will disappear to make room for a large building made so as to entirely satisfy the requirements of the Railway, the Navy, and the Customhouse Services.

Other works for the establishment of dry docks and for



MAIL-BOAT.

the deepening of the channel and of the Outer-Port are also contemplated by the Government.

Thanks to the improvements brought during the last few years to the Port of Ostend and to the better conditions of access realized by the digging of the passes in the « Stroombank, » the shipping trade is in serious progress as shown by the following table, indicating the tonnage

of the merchant-ships which entered the harbour during the years 1894 to 1902 :—

YEARS.	TONNAGE AT THE ENTRANCE.
1894	176,823 Moorsom tons.
1895	178,010 »
1896	247,674 »
1897	356,321 »
1898	336,272 »
1899	351,736 »
1900	356,556 »
1901	378,908 »
1902	366,548 »

The principal articles of importation are Norwegian ice, nitrate of soda from Chili, English coal and timber from the North.

Relating to exportation, the commerce comprises chiefly alimentary commodities destined to the market of London.

It is carried on by two regular lines of cargo boats, the first of which belongs to the « General Steam Navigation Company » and the second to the *Société John Cockerill*.

The Port of Ostend is, besides, the home port of the Belgian State Mail Packet Service between this harbour and Dover. These packet-boats make regularly three daily passages each way.

We have already pointed out in the chapter on « Waters and Forests » the importance of Ostend as a fishing harbour.

The value of the fish sold at the fish-market of Ostend amounted to :—

3,974,420	frances in 1899
4,541,900	» 1900
4,746,642	» 1901
4,802,893	» 1902

THE PORT OF NIEUPOORT.

The port of Nieuport is situated at the mouth of the river Yzer. It includes a channel of access, a dry harbour, a wet dock and an interior harbour.

The outer channel is 600 metres long and 80 metres wide. It is comprised between timber piers adjoining low masoned jetties.

WALK-DAM AT NIEUPOORT.

The West pier is connected with the downs by a walk-dam.

The part of the channel which extends before the town is used as a dry harbour. It is provided with wharfs of a total development of 300 metres. On the platform of the wharf there are tracks, connected with the State Railway and with the tramway line from Ostend to Furnes.

The importation movement is principally composed of coal, North timber, slates, oysters and lobsters.

The exported articles are namely broken porphyry stones, oak barks and bricks.

THE OLD BEACON AT NIEUPORT.

THE PORTS OF ZEEBRUGGE AND OF BRUGES.

The town of Bruges was in the Middle-Ages one of the most important ports on the continent. It was in direct communication with the ocean by an arm of the sea called « Zwyn » which became, by degrees, filled with sand and with it the prosperity of the old Hans town disappeared.

For ages, Bruges had no other access to the sea than the

THE TOWN-HALL OF THE « FRANK DE BRUGES ».

canal to Ostend, a way of evacuation of 4 m. 30 to 4 m. 50 of depth. This communication appeared insufficient to realize at Bruges the commercial renovation that the town has long desired ; the law of the 11th of September 1895 crowned their efforts with success in allowing them a direct access to the sea.

But the public powers thought that it was not sufficient

to give simply to the maritime canal of Bruges an entrance to the sea; fully realizing the necessities of modern navigation, they considered that, by creating on the Belgian coast a touching harbour where regular lines could touch without loss of time, they would offer to the shipping trade inducements which would not fail to be appreciated. The touching is difficult for large steamers when it requires of them an important roundabout journey, for the general expenses and the loss of time are factors which seriously influence the return of the ship. Belgium, with its rapid railway communications with Paris, Berlin,

THE MOLE AT ZEEBRUGGE.

St.-Petersburg, Vienna, Italy and Constantinople, offers economical conditions which are drawing the attention of the traders. It only missed a touching harbour. The harbour of Zeebrugge will fill up this want.

The touching harbour of Zeebrugge is composed of a pier or mole rooted in the downs and describing a curve towards the East, the extremity of which is brought back parallelly to the coast.

At 850 metres from the foot of the pier, towards the East, runs the channel of access which abuts to the mari-

THE « TITAN » CRANE AT THE END OF THE PIER.

time lock commanding the entrance of the new canal towards Bruges.

The mole is formed of three parts : the first on the strand is solid ; the second, which follows, is open ; the third is also solid. The total length of the mole is 2487 metres.

Along the third part of the pier there is a platform 74 metres wide, limited towards the road by a quay wall for the mooring of ships. At the foot of this wall which has 1721 metres of development there are depths of at least 8 metres at low water. At high tide the depth is increased by the whole rise of the tide which is 4 m. 60.

The pier limits a road of 136 hectares, and protects it from the dominant South-West, West and North-West winds.

The part of the pier *on the strand* is constituted by a masoned wall, 3 metres in thickness. Under shelter of this wall an embankment is established for the passage of a double railway track ; it is 11 metres wide and is covered with a masoned pavement. It is protected on the inside by a dry stone facing. Offward, on the wall, rises a parapet along which there is a footway.

The second part, built on pillars, leaves an opening of 250 metres which has for object to allow the circulation of the currents in the road sheltered by the mole so as to diminish the deposits of mud. Its platform, which is 12 metres wide, supports the double railway track.

Offward, on the whole length of the work, there is a screen formed by a sheet iron wall 4 m. 80 high, destined to shelter the trains. This screen bears at its upper part the footway.

The outer part of the mole is again divided in two : the first portion 1715 metres long, shelters the platform of the mole ; the second, 240 metres long, constitutes a break water. It is terminated by a jetty-head on which is established a tower bearing a light.

The outer mole is capped offward on its whole length by a parapet behind which the footway continues.

Towards the road, the platform of the mole is limited by a quay along which the ships will be able to land. It will be provided with a complete equipment of railway tracks, electric cranes, stores, buildings for passengers and custom-house offices, in order to allow of the most rapid loading and unloading.

The channel of access to the maritime lock has 750 metres in length, 50 metres in normal width at the bottom, and 6 metres in depth under low water. Its banks are diverging accross the strand, so as to offer an entrance of the width of 200 metres. They are bordered by low masoned jetties and frame piers. The jetty-heads which end the low jetties bear each a harbour light.

Accommodations for fishing boats are established on the Eastshore. They include : a stranding dock limited by frame or trestle works, a careening bank and a landing place.

The maritime lock is 20 metres wide ; it is composed of two independent lock-heads and of a chamber 158 metres long.

The interior harbour is situated immediately above that sluice. It is 660 metres long and 50 metres wide at the bottom.

Against the East shore there is a siding dock destined to the sanitary visit of ships.

The ship canal to Bruges opens into the interior harbour ; its axis coincides with that of the sluice and of the channel of access to the sea. It is 22 metres wide at the bottom and 70 metres at the waterline. Its depth is 8 metres.

The harbour of Bruges includes two docks connected by a lock to the existing canal from Bruges to Ostend, and bordered with platforms provided with cranes, sheds, railways, and the necessary buildings for the working of the harbour.

The two docks are parallel and are of different lengths ; they are separated by a quay 120 metres long. The West dock is 540 metres long and has 6 m. 50 depth of water. The East one is 800 metres long and 8 metres deep.

They are connected by an manœuvring dock into which opens the new canal.

It is at the further end of the West dock that the semi-maritime lock is situated, which connects the docks of Bruges with the canal of Ostend, *i. e.* with the general navigable net-work of the country.

The construction of the ports of Zeebrugge and of Bruges is being executed according to the plans presented by Messrs. Coiseau and Cousin.

It must be finished by the 31st of December 1905 and will cost about 56 million francs.

THE NAVIGABLE WATERWAYS OF BELGIUM.

The civil engineers of the government are called in Belgium, as they are in France, *Ingénieurs des Ponts et Chaussées*. The Administration of the *Ponts et Chaussées* has in its province all that concerns our sea- and interior ports, navigable waterways of every kind and roads. The engineers composing that administration have always proved to be equal to their task.

Thus, regarding the network of navigable waterways, which is almost entirely controlled by the State, it is impossible to find any other country in Europe as well provided as Belgium.

This network can be divided in two parts, the Eastern and the Western division, both of which converge on Antwerp, the great center of maritime and inland navigation. At the present time, the two divisions are only connected at the north, by the portion of the Lower Scheldt comprised between the mouth of the Rupel and the city of Antwerp, which belongs to them both.

The *canal du Centre* in course of construction, will provide them with an additional connection, much needed and very desirable, but also very difficult to realize as we shall explain hereafter.

The system of the Belgian waterways does not only radiate over the whole territory, it is also connected with those of the neighbouring countries : the Netherlands, Germany, and France.

Thanks to the development of this net-work, to its improvement, unceasingly pursued, and to the very low

THE HYDRAULIC ELEVATOR AT LA LOUVIÈRE.

rate of the tolls levied, the transportation of merchandises, either raw or manufactured, is carried on between the industrial and commercial centers of Belgium, as well as between the same and those of the surrounding countries, under conditions most favorable to the commerce, industry and agriculture of the kingdom.

The Belgian navigable waterways measured in 1901 a total length of 1800 kilometres. They required for the ordinary repair and improvement expenses a yearly sum of 2,446,000 francs (the expenses for the administration and control staff being excluded). Besides, an important sum is affected, every year, to extraordinary expenses for new constructions and redemptions. That class of expenses has absorbed during the period from 1871 to 1901 a total sum of 217,751,000 francs.

Concerning *harbours, light-houses, beacons and maritime installations*, their keeping in order has required in 1901 a sum of 775,000 francs. The government has effected, from 1871 to 1901, extraordinary works for a total sum of 138,418,000 francs.

The movement of transportation by the navigable ways is constantly increasing. It was, in 1880 of 362 million, in 1894 of 696 million, and in 1902 of 918 million ton-kilometres. In nine years (from 1894 to 1902), it has increased of more than 33 per cent.

The traffic for 1902, which shows an increase of 7.7 per cent against that for 1901, is divided as follows :—

NATURE OF THE GOODS	TON-KILOMETRES
Mineral fuel	249,627,127
Metals (wrought and unwrought), building material, ores, ceramic and glass products.	332,992,094
Wood and agricultural products	185,448,513
Various products	150,184,720
Total. . .	918,252,454

The increase was divided proportionately between the four classes of goods.

Among the works in course of execution, intended for completing and improving the system of navigable water-

THE HYDRAULIC ELEVATOR AT LA LOUVIÈRE.

ways in Belgium, let us mention the construction of the *canal du Centre* in the province of Hainault. This canal will not only connect the important coal fields of Mons and of Charleroi, but also, as already pointed out, the two great divisions of the Belgian canal net-work. The very serious difficulties encountered in its realization, can be attributed to three main causes, viz : the great difference in level on a very short distance ; the lack of a natural water supply for the higher reaches and the sinking of the ground, on account of the undermining by the collieries near by. These obstacles however, have been overcome and it is expected the canal will be finished in the year 1906. The total fall of about 90 meters will be divided between six locks and four hydraulic lifts. The first of these, erected at La Louvière, has been used for sixteen years without any accident. Its lifting height is 15 m. 40 and it comprises two steel chambers, moving in opposite direction and supported each on a vertical plunger, two metres in diameter. The duration of the whole operation, including the coming in of two 360 ton barges, their simultaneous ascent and descent and their going out of the lift, is fifteen minutes. The vertical motion of the chambers requires only $2 \frac{3}{4}$ minutes. The cost of this piece of engineering work has been 1 million 412,000 francs.

HIGHWAYS NET-WORK.

The highways net-work reached on the 31st of December 1902 a length of 7729 kilometres.

Since 1899, the net-work has increased and the repair cost per kilometre has varied as is shown in the following table.

YEARS	LENGTH IN KILOMETRES	REPAIR COST PER KILOMETRE
1899	7545	592
1900	7664	1032
1901	7688	659
1902	7729	894

It must be remarked that the repair cost per kilometre is calculated as well for the paved as for the stoned roads, as well for the town crossings (where it reaches 1200 fr.), as for the open country (where it diminishes sometimes to 3 francs).

The credits affected to the yearly repairs vary from 5,800,000 francs to 6 million francs. It is probable that they will progressively increase to at least 8 million, the kilometric length remaining the same.

The general rebuilding of State roads and highways will require an expenditure valued to 60 million francs, besides the expenses for ordinary repairs.

RAILWAYS.

Railways of Main Communications.

The development of railways in Belgium has been exceedingly rapid. Our net-work, the first on the Continent, was decreed in 1834; in 1865, the importance of the lines was of 2300 kilometres, of which 750 belonged to the State; in 1896, the net-work included 4584 kilometres, of which 3310 belonged to the State. In 1897, several important lines were bought from companies by the State,

RAILWAY STATION, TOURNAI.

which is now in possession of almost the whole Belgian net-work.

The length of the lines worked by the State and by the companies amounts to a total of 4581 kilometres, which corresponds with 156 kilometres of worked railways per 1000 square kilometres of the area of the territory. The Belgian net-work is therefore the closest in the world.

The following statistical information is taken from the railway operations for the year 1902 : —

	RAILWAYS WORKED BY THE STATE	RAILWAYS WORKED BY COMPANIES
Situation on the 31 st of December 1902		
Total length of lines km.	4050 k. 163 m.	531 k. 998 m.
Capital affected to the tracks, fix installations, &c. fr.	1,554,944,398	—
Capital affected to the material of traction and transport. . . . fr.	486,156,560	—
Total, or capital of first establish- ment. fr.	2,041,100 958	—
Gross earnings ».	215,465,647	26,859,738
Working expenses ».	135,478,386	12,164,826
Net profit or surplus of gross earnings on working expenses fr.	79,987,261	14,694,912
Co-efficient of exploitation . . . ».	62 fr. 88 c.	45 fr. 29 c.
Number of stations and halts . . .	1284	195
Number of locomotives	3013	306
Material of transport : Number of vehicles	73,646	7,541
Number of kilometres travelled over by the trains	62,304,891	5,984,075
Number of travellers transported. .	127,109,684	15,381,216
Number of traveller-kilometres . .	2,826,721,757	—
Number of tons of heavy goods trans- ported	42,611,819	14,311,364
Number of clerks, employees and workmen	61,387	5,693

International lines running through Belgium.

From London-Dover to Ostend-Ghent-Brussels;
 Brussels-Herbesthal to Cologne;
 Ostend-Schellebelle-Malines-Louvain to Cologne.
 From Paris to Quévy-Mons-Brussels-Antwerp-Esschen
 to Rotterdam and Amsterdam;
 Antwerp-Hamont to Dusseldorf;
 Liege-Namur-Charleroy-Erquelinnes to Paris;
 Brussels-Kleinbettingen to Luxembourg-Basle.
 From Calais-Lille to Blandain-Tournai-Ath-Brussels.

From Paris and Lille to Mouscron-Courtrai-Ghent.
 From Paris and Lille to Mouscron-Courtrai-Roulers-Ostend.

Belgian State Railways and Mail Steamers.

London via Dover-Ostend, three services daily, 3 hours sea passage.

London-Brussels, in 7 1/2 hours; *London-Cologne*, in 12 hours; *London-Berlin*, in 20 hours; *London-St. Petersburg*, in 50 hours; *London-Warsaw*, in 33 hours; *London-Basle*, in 17 hours; *London-Milan*, in 28 hours.

London-Ostend-Basle, thrice daily, in 17 hours, all the year. Additional « *train de luxe* » in Summer.

London-Ostend-Italy, thrice daily, all the year. Additional « *train de luxe* » in Summer.

London-Ostend-Berlin, in 20 hours. The daily Nord express.

London-Ostend-St. Petersburg, in 50 hours, via Nord express, twice weekly.

London-Ostend-Warsaw, in 33 hours, once weekly, via Nord express.

London-Vienna, in 29 hours, via Ostend-Vienna daily express.

London-Constantinople, in 70 hours, via Ostend-Vienna and Budapest, 5 times weekly.

London-Alexandria (Egypt), in 5 1/2 days, weekly, via Ostend-Vienna-Trieste daily express.

Liege.—Universal and international exhibition, 1905.—The city of Liege can be reached in 1 1/2 hour by rail from Brussels, 2 hours from Antwerp, 6 hours from Paris and 9 hours from London.

Goods traffic with England : *Ostend-Tilbury* line, daily express goods service.

Locomotives.

The administration of Belgian State Railways has given for the last few years an important extension to the use of

the mixed engines, able to haul indifferently heavy slow passenger trains and goods trains.

These engines with two objects facilitate the organization of the rolling of engines in the engine-houses, and cause better yield of the material and of the staff, by suppression of long stations at the terminal of the journey, the engines being able to rejoin the depot by goods trains or passenger trains.

These engines are of the 6-coupled wheels of 1 m. 52 type; the last model (type 35) just created is with 6-coupled

RAILWAY STATION, OSTEND.

wheels of 1 m. 60; the great proportions given to its boiler with a view to increase its power, which is claimed by the continual increase of the weight of slow or direct trains, allowed a boggy to be put in front. Thanks to this means the engine can perform, with a perfect stability, a speed of 90 kilometres an hour, speed seldom obtained by the trains for which the engine has been built.

The overheating of the steam having generally given favourable results with respect to the economy of fuel and to the power of the engines, the administration of Belgian State Railways are trying its application on the

engines : at the end of 1903, they were going to put into service four engines supplied with over heaters, three of which were of the system Schmidt of Wilhelmshohe, and one of the system studied by the *Société Cockerill*. Three new engines, of the type 35 described above, have been supplied, one without over heater, one with over heater Schmidt and the third with over heater Cockerill. These engines coming from the same workshops, and being identically kept in repair, will be subjected to the same trials so as to appreciate the overheating at its real value.

The weight and the speed of express trains being in continual increasing, the Belgian State Railways had in building at the beginning of 1904 some specimens of express engines with 6 coupled wheels of 1 m. 98, with a boggy in front. These engines present some particularities which distinguish them : one of them is compound with 4 cylinders in line; another is identical to the precedent, one, but will be eventually provided with an over heater, the one which the trial undertaken with the type 35 engine will have indicated as having given the best results. Two others specimens are with 4 equal single cylinders, one without over heater, the other eventually with an over heater. Experiments made on these different engines will suffice to explain the compoundage and the overheating as concerns the yield, the keeping in repair, &c.

Each of these specimens will be seen at the Liege Exhibition in 1905.

Passengers Material.

The Belgian State Railways have adopted, in a general manner, the three axles carriages; however, a certain number of carriages built on boggies are chiefly kept for international trains.

The last types of carriages are with lateral corridor and W.C.

The lateral corridor is much appreciated by passengers; it permits them to choose a convenient place even when the train is in motion; it prevents the passenger from being alone and exposed to criminal attempts in compartments completely separated from the other part of the

train; lastly, thanks to this corridor, the W.C. has been able to be placed as far as possible from the compartments.

In second class carriages only three or four passengers are admitted per bench, whether the carriages are provided with a corridor or not. This measure has allowed the use of elbow-rests and head-cushions which considerably increase the comfort. Besides, the width of these compartments has been taken from 1 m. 73 to 2 metres. These carriages are heated by steam; the electric lighting is of the Stone system. The number of carriages

RAILWAY STATION, FURNES.

in use, lighted by the Stone system is now 982, including 15,480 lamps.

Among the interesting vehicles created lately by the Belgian State Railways, we must mention the luggage-vans, built on three axles or on boggies.

Goods Stock.

The most important progress realized in the goods-wagons is the increase of the load. In modifying the

suspension and in replacing the axles by stronger pieces, they were able to bring to 12 and even to 15 tons the tonnage of a large number of 10 tons wagons.

For the new coal-wagons bought during the last few years, they have at the same time increased the capacity of the case.

These cases contain 19,500 cubic metres, so that one can load 15 tons of lightest coal.

The Belgian State have tried to give to the frame-work of the wagons a greater rigidity; they have created to that end the frame-work with cast-steel stays. This rigidity of the frame-work prevents the case from the fatigues coming from the deformations of the old frame-work; it helps to make the case very light and easy to be kept in repair.

The Belgian State have moreover built refrigerative wagons for the transport of alimentary products. In these wagons, ice-tanks have no direct action on the inside of the wagon, which prevents condensation, in the space kept for the loading of articles, of the water steam contained in the air.

The air, coming from the inside of the wagon, enters the compartment of the ice-tanks by the upper part, gets cold and goes down through the cooling apparatus in leaving the water with which it was loaded; it then returns, cold and dry, into the wagon through the pipes placed between the two separations of the double floor.

Light Railways.

Belgium has completed its means of communications by an organization which gives excellent results : that of Light Railways, the aim of which is to bind the communes together and to join them to railways.

The State works an electrical light railway of a length of 11 kilometres.

The service is insured by 12 motor-cars and 22 trail-cars.

Light railways have taken a great extension thanks to the happy financial combination, which allowed the collection of the necessary resources for their construction.

A law of May 28th 1884, which has been replaced by that of June 24th 1885, authorized the Government to

approve the statutes of a joint-stock company constituted at Brussels under the denomination of *Société nationale des Chemins de fer vicinaux*, and fixes the general conditions under which such lines may be granted to that Company for an unlimited term.

In order to collect the necessary capital for the establishment of each line and eventually for its working stock, the company emits a series of shares of 1000 fr. which are subscribed by the State, the Provinces, and the interested Communes, and, the case occurring, by private individuals. However the intervention of the State, as a subscriber of shares, cannot exceed the half of the nominal capital of each line, unless otherwise provided by a special Act, and the intervention of individuals cannot exceed the third part of that capital.

The State, the Provinces, as well as the Communes that justify necessary resources, may be liberated by annuities, in 90 years; the shares of annuities thus subscribed are immediately given back to the company and are inalienable.

The shares subscribed by individuals must be entirely liberated at epochs to be determined.

By a series of Royal Decrees mentioned below, the company has been authorized to emit bonds redeemable in 90 years, by means of a drawing, in representation of annuities due to the Company.

Royal Decree of the 6th of July 1885, bonds with premium interest, 2 1/2 per cent, 30 million francs.

Royal Decree of the 22nd of April 1890, bonds with interest, 3 per cent, 15 million francs.

Royal Decree of the 30th of May 1892, bonds with interest, 3 per cent, 18 million francs.

Royal Decree of the 12th of October 1895, bonds with interest, 3 per cent, 35 million francs.

Royal Decree of the 18th of October 1900, bonds with interest, 3 per cent, 50 million francs

Royal Decree of the 16th of September 1903, bonds with interest, 3 per cent, 100 million francs.

These bonds are signed by the Treasury.

The State guarantees to the third persons the interest and sinking of the obligations during the same length of time.

Each series of shares is entitled, in certain limits,

to the profits produced by the line to which it belongs.

The net profit of each line is divided between the shareholders of the line, according to a rate fixed by the administration committee and according to the capital paid or to the amount of corresponding annuity as a first dividend.

After deducting of the part attributed to the administration the surplus is used : for $1/4$ to constitute a provision fund, for $3/8$ to pay a second dividend, for $3/8$ to form a reserve fund which is destined to cover the eventual losses of the company, as well as to extend and improve the network.

The State pays at its cash-offices, instead of the *Société nationale* and as a mandatory, the interests due and the reimbursement of the redeemed bonds.

The *Société nationale*, while maintaining the direct control exercised by its central administration, has generally adopted since its institution, the system of hiring the working of its lines to private industry, leaving thus to the latter, according to the wishes of the government, a share in the work of light railways.

On the 31st of December 1902, there were in operation 101 lines of an average total length of 2158 kilometres, of which 1598 kilometres on existing road and ways, and 560 kilometres on special seat. At the same date, the length of granted lines was 2900 kilometres and the capital constituted was 155,907,000 francs.

There will therefore soon be 97 kilometres of light railways by 1000 square kilometres.

The total receipt in 1902 was 11,566,659 francs; the expenses 7,889,941 francs. Per train-kilometre the receipt was 0 fr. 90 and the expenses 0 fr. 61.

The rolling stock of light railway lines was : -

408 engines;

1068 passenger carriages;

244 luggage vans;

3306 divers wagons.

Five light railways granted to the *Société nationale* of a length of 86,066 metres are now operated by means of electricity. The service is insured by 110 motor-cars and 112 trail-cars.

Only one line (the tramway of the *Nord d'Anvers*—5 kilom. 06) is operated by horses.

The government is allowed, in certain cases, to lease light railways to individuals.

The light railway line from Ans to Oreye, of a length of 17 kilometres, which was leased to an individual by virtue of article 2nd of the law of the 24th of June 1885, is operated by steam.

The Packet Service between Ostend and Dover.

The line of packet-boats running between Ostend and Dover was started in March 1846.

At first there was only one departure a day, and no boat ran on Sunday; the passage was made at night, the

MAIL BOAT « THE PRINCESSE CLÉMENTINE »

service being made alternately by steamers belonging to the Belgian government and to the English Admiralty.

In 1863, the Belgian government, impressed with the importance of frequent and regular communication with

Great Britain, took the whole service into their own hands, and at the same time organized in addition one departure of steamers by day.

In 1886, the Ostend-Dover line became in jeopardy; rival services had been organized, and, in addition, the plant of the Belgian line was not up to the level of progress required by the times.

The number of passengers carried between Ostend and Dover and vice versa in 1886 did not exceed 30,000.

In this juncture the Belgian Government did not show any hesitation; they determined to start a third service, and they renovated the whole floating plant. Thus the three steamers *Prince Albert*, *Ville de Douvres*, and *Flandre*, all of which were turned out by the John Cockerill Company, and were able to make more than 19 knots an hour, took their places in the fleet. They were followed by the *Princesse Henriette* and *Princesse Joséphine*, which were built by the Scotch firm of Denny Brothers, and have the higher rate of speed of 21 knots. Later on were added the *Leopold II* and the *Marie-Henriette*, built respectively by the firm of William Denny and the John Cockerill Company of Seraing (Belgium). These two boats have the still greater speed of 22 knots. The Cockerill Company built in addition the *Rapide* and lastly the *Princesse Clémentine*.

All these steamers are provided with Marcony's system of wireless telegraphy, which enables them to communicate at any moment with each other and with the land.

At the present time there are three daily services each way, putting Great Britain in direct communication with the principal cities of Europe.

The time required for the various journeys is thus reduced to a minimum. By the Ostend route the journey from London to Brussels takes 7 hours; to Basle, 17 hours; to Berlin, 20 hours; to Bucharest, 51 hours; to Budapesth, 34 hours; to Cologne, 11 hours; to Frankfort-on-Main, 15 hours; to Geneva, 23 hours; to Hamburg, 20 hours; to Lucerne, 19 hours; to Milan, 26 hours; to Munich, 23 hours; to St. Petersburg, 49 hours; to Strassburg, 15 hours; to Vienna, 28 hours, and to Zurich, 20 hours.

The addition of these new boats to the service was naturally followed by the enlargement of the entrance to

the port of Ostend, the deepening of the channel, and the building of new wharves.

These efforts have been crowned with remarkable success : the passenger-traffic by the Ostend-Dover route has considerably increased since 1896, it amounts to about 120,000 in the year, and this figure has even been exceeded.

However, this result is not surprising, when it is considered that, apart from the superiority of the plant, which allows of the crossing being made, under favourable circumstances, in less than three hours, the geographical position of Belgium and its elaborate railway system, make this country the natural connecting link between Northern, Central and Southern Europe, Egypt and the East on one side, and Great Britain, and, by way of that country, North and South America, on the other.

The fares for the passage from Ostend to Dover are extremely reasonable. Tour tickets are issued at reduced rates and available for a sufficiently long period, between all the towns of England and those of Belgium, Germany, Austria-Hungary, Switzerland and Italy. Thanks to an agreement with the international Sleeping-Car Company and the great European Express Companies, long runs are now made under the pleasantest conditions.

All the Ostend-Dover boats vie with each other in comfort and luxury, and they are fitted up throughout with electric light. Spacious dining-saloons enable the passengers to take their meals in comfort and according to their individual taste.

Ladies are looked after most assiduously by the stewardesses.

Among these fine steamers particular mention must be made of the *Princesse Clémentine*, which is the most recently built, and is the fastest of them all. She was turned out by the Cockerill Company, and is one of the finest specimens of modern naval architecture; she may in fact be considered the pearl of the whole fleet.

The dimensions of the *Princesse Clémentine* are : length, 351 feet; breadth, exclusive of paddle-boxes, 78 feet; her engines are enormously strong, i. e. 9200 H. P., and her average speed exceeds 22 knots, representing more than 25 miles an hour.

This boat is entirely built of soft steel; she is divided

lengthways into twelve water-tight compartments in such a way that, in case of a collision, any one of her compartments may be filled with water without the vessel being exposed to danger.

The steamer has three separate decks; there is further a large commander's footbridge fitted up to admit passengers.

On fine Summer days, when the crowding is at times very great, this innovation allows passengers the choice of two promenade-decks instead of one, on which from 600 to 700 passengers can find comfortable places.

The centre part of the upper promenade-deck is occupied by a spacious deck-house, containing twelve private staterooms, a smocking room and a luxuriously fitted up saloon.

The decoration of these apartments is treated in the richest possible manner, in the same style as the dining-saloon and the first class ladies' saloon, situated abaft the main-deck.

All the rooms on the boat are heated by steam, and the vessel is lighted throughout by means of 248 incandescent lamps.

From every point of view this magnificent boat reflects the greatest possible credit on the Belgian ship-building industry.

As a proof that Belgium is abreast with the most modern naval requirements, the fleet of the Ostend-Dover service will shortly include a new and very fast turbine steamer.

Naval Education.

There are two Schools of Navigation, the first in Antwerp, the other in Ostend, organized by the State and intended to train up officers for the merchant service; teaching is gratuitous in these establishments.

Special courses have also been instituted there, for those who wish to obtain a certificate of engineer of steamship.

A course of elementary navigation has been established for fishermen at Nieupoort.

The State has also organized in Ostend since 1867 a school for ship-boys, intended to train up sailors for the

merchant navy, and fishermen. The number of pupils is limited to 120 who are lodged on board a three-master and a pontoon, where, besides the theoretical professional instruction, they receive the elementary education; they are in rotation, by gangs of 30, put on board of the cruisers having charge of the international supervision of the North Sea Fisheries.

POSTAL SERVICE.

The State enjoys the monopoly of the reception, conveyance and distribution of letters.

As stated by the Constitution, the secrecy of letters is inviolable.

The number of Post-Offices is 1318, 1250 of which are sedentary and 68 travelling. The first secure all the branches of the service, while the latter, which operate in the railway-trains, are exclusively busy handling the letters in course of conveyance. In proportion to the area of the country (29,455 Km².), there is one immoveable office for each 23,6 Km².

The working staff comprises 3017 officials and clerks and 4391 postmen and other subaltern agents; besides, there are 3897 temporary agents who have special charge to act as substitutes for the postmen and of whom 1289 perform with regularity additional rounds.

In Belgium there is at least one daily delivery of letters in each locality. This delivery extends over all the communes, sections of communes and isolated dwellings without the slightest exception.

With regard to the number of daily deliveries, the 2628 Belgian communes are portioned out as follows : -

679 communes have one delivery a day ;					
1487	"	"	2	deliveries a day ;	
266	"	"	3	"	"
116	"	"	4	"	"
59	"	"	5	"	"
11	"	"	6	"	"
1 commune has			7	"	"
9 communes have			9	"	"

which amounts for the whole country to an aggregate number of 5358 daily deliveries, which are performed by a working staff of 5067 postmen and provisional postmen.

In addition to the letter-post, properly so called, the working operations of the Belgian Post-Administration are carried on by the following services :—

1° Issue and payment of inland and international Money-orders and Postal-orders ;

THE CENTRAL POST-OFFICE, BRUSSELS.

2° Cashing of bills either single or with goods payable on delivery ;

3° Presenting for acceptance and cashing of bills of exchange ; protesting of the same ;

4° Cashing of rent or dividend coupons of shares or debenture bonds, or shares payable to the bearer ; payment at sight of the interest-coupons of the National Debt and other securities thereto assimilated ;

5° Subscription to newspapers and periodicals ;

6° Reception of deposits for the savings bank, the superannuation and assurance funds; paying and repaying moneys on account of these institutions.

Moreover the Post-Office lends its assistance to other administrations for the different special services hereafter enumerated :

- a) Reception and delivery of small parcels;
- b) Sale of stamped bills and of adhesive stamps for bills of exchange;
- c) Stamping of paper for bills of exchange;
- d) Sale of licences for fishing;
- e) Payment : 1° of indemnities to owners of bovine cattle stricken with tuberculosis or anthrax and declared, when slaughtered, to be unfit for human food;
- 2° Of sums allotted to volunteers who having enlisted with premium, are granted unlimited furlough, and to recruiting agents;
- 3° Of presence counters granted to the members of the electoral offices;
- 4° Of the instalments of old age pensions.

* * *

Hereafter a summary of rates (Inland Service) :

ABBREVIATIONS : *fr.* = franc; *c.* = centime; *gr.* = gramme.

Ordinary letters.	10 c. for 15 gr.
Post-cards.	5 c. (single), 10 c. (for reply post-cards).
Newspapers.	1 c. for each paper and for 75 gr. including supplement
Printed matter.	2 c. for 50 gr. The freight of printed matter on an uncut sheet not weighing over 25 gr. is 1 c.
Samples.	5 c. up to 100 gr., 10 c. from 100 to 200 gr., and 15 c. from 200 to 350 gr. (maxim. weight).
Business papers.	5 c. for 100 gr. with minimum of 10 c. for each parcel (maxim. weight 1 kilog.).
Registration.	The fee is 25 c in addition to the ordinary postage.
Insured letters.	1° Postage of ordinary letters of same weight; 2° Fixed fee of 25 c.; 3° Insurance fee of 10 c. for 1000 fr.

Money-orders.	Up to 10 fr. 10 c. Above 10 » up to 20 fr. 15 » » 20 » » 50 » 20 » » 50 » » 100 » 30 » » 100 » » 200 » 40 » and so on, adding 10 c. for each 100 fr. up to 1000 fr.; above 1000 fr., the fee of each order is increased of 10 c. for 200 fr. or fraction of 200 fr.
Postal-orders.	5 c. up to 10 fr., 10 c. from 11 to 20 fr. (maxim.).
Cashing of bills (single).	Up to 20 fr. 10 c. Above 20 » and up to 50 fr. 20 c. » 50 » » 100 » 30 c. » 100 » » 200 » 40 c. and so on, by adding 10 c. for each 100 fr. up to 1000 fr.; above 1000 fr., the fee for each bill is increased of 10 c. for 200 fr. or fraction of 200 fr.
Payment on delivery.	Same fees as for cashing bills, except that the minimum is 15 c. for each bill, in addition to the freight of the parcel according to its kind.
Bills of exchange presented for acceptance.	20 c. for each bill.
Cashing of bills of exchange.	10 c. for 100 fr. or fraction of 100 fr. up to 1000 fr. with minimum of 25 c. for each bill. Above 1000 fr. 50 c. for 1000 fr. or fraction of 1000 fr.
Interest or dividend coupons, others than those of the National Debt which are exonerated from all taxes.	1° Fee of 1 c. per coupon; 2° Proportional fee calculated according to the aggregate amount of coupons acknowledged by each memorandum of deposit, at the rate of 1 c. for 10 fr. or fraction of 10 fr., up to 100 fr. and of 1 c. for 20 fr. or fraction of 20 fr. for the surplus. These combined fees are rounded in even numbers of 5 c., by forcing the fractions.
Paying off shares.	Same fees as for cashing bills of exchange, provided they are calculated not on each share, but on the aggregate value of the shares mentioned on the memorandum of deposit and which may be cashed at once in the same establishment.
Subscriptions to newspapers.	1° Postage of ordinary newspapers of same weight; 2° Proportional fee of 2 1/2 per cent reckoned according to the amount of subscription, previously deducting the postage. The minimum of the proportional fee is 10 c. for each inscription and the maximum, 20, 40 or 75 c. according to the duration of subscription (3, 6 or 12 months).

*
* * *

The following table shows the numerical results of the

working of the Postal Service for a certain number of years.

Correspondence.

YEARS	NUMBER OF LETTERS	NUMBER OF NEWSPAPERS	NUMBER OF PRINTED MATTERS
1850	13,010,329	8,739,000	2,965,000
1860	27,935,902	26,358,020	6,668,452
1870	53,043,991	46,871,539	18,125,198
1880	85,072,308	71,830,000	36,673,000
1890	112,052,456	94,639,558	73,599,461
1900	162,983,336	134,724,720	123,648,551
1902	179,424,026	139,744,644	154,492,624

The post-cards have been created on December 28th 1870.

Statistical informations are wanting for the years previous to 1860 with regard to samples.

Business papers have been admitted to postal transmission since April 30th 1868.

YEARS	NUMBER OF POST-CARDS	NUMBER OF SAMPLES	NUMBER OF BUSINESS PAPERS
1860	»	62,113	»
1870	»	756,964	53,469
1880	18,116,228	2,674,000	452,000
1890	36,365,017	3,675,217	1,124,994
1900	65,384,943	6,479,911	2,031,419
1902	76,759,436	7,809,750	2,372,344

Money and Post-Orders.

The service of international Money-orders has been organized since January 1st 1866.

The service of post-notes has become operative on January 1st 1884.

YEARS	INLAND POST-ORDERS ISSUED	INTERNATIONAL MONEY- ORDERS ISSUED	POST-NOTES ISSUED
1850	{ Number . 34,369	»	»
	{ Amount . 790,477	»	»
1860	{ Number . 232,500	»	»
	{ Amount . 5,296,610	»	»
1870	{ Number . 528,608	41,118	»
	{ Amount . 24,968,188	1,700,171	»
1880	{ Number . 1,146,430	150,672	»
	{ Amount . 72,488,037	7,979,071	»
1890	{ Number . 936,739	300,979	965,976
	{ Amount . 93,310,997	14,850,181	8,122,138
1900	{ Number . 1,373,531	445,597	1,361,474
	{ Amount . 160,136,223	24,364,632	11,406,265
1902	{ Number . 1,525,197	502,297	1,448,761
	{ Amount . 184,493,857	26,613,992	12,141,216

Cashing.

Statistical informations are wanting concerning the Bills deposited during the period previous to 1860.

The postal service for cashing bills of exchange has been inaugurated on October 1st 1876.

The postal service for cashing interest coupons has been inaugurated in 1883.

YEARS	INLAND SERVICE		
	BILLS DEPOSITED	BILLS OF EXCHANGE DEPOSITED	COUPONS OF INTEREST AND SHARES DEPOSITED
1860	{ Number 59,732	»	»
	{ Amount 1,015,444	»	»
1870	{ Number 290,026	»	»
	{ Amount 5,000,000	»	»
1880	{ Number 1,124,270	933,755	»
	{ Amount 24,967,210	242,178,553	»
1890	{ Number 3,558,189	1,873,160	164,620
	{ Amount 117,775,972	451,339,410	1,506,755
1900	{ Number 6,936,666	2,710,683	143,453
	{ Amount 314,182,472	688,587,899	1,374,377
1902	{ Number 7,949,276	2,945,911	139,707
	{ Amount 349,466,480	696,611,023	1,233,022

The postal service for international recovering has been established on May 1st 1880.

YEARS	INTERNATIONAL SERVICE	
	SECURITIES DEPOSITED IN BELGIUM	SECURITIES ORIGINATING FROM ABROAD
1880	678,379	876,511
1890	2,413,481	2,671,134
1900	3,722,989	3,983,914
1902	4,164,141	4,792,448

Subscriptions to Newspapers.

1850	. . . . .	24,382
1860	. . . . .	59,473
1870	. . . . .	155,127
1880	. . . . .	267,812
1890	. . . . .	281,974
1900	. . . . .	504,962
1902	. . . . .	494,676

Savings-Bank.

The postal service of the Savings-Bank is in operation since January 1st 1870, and the rent-books have been instituted in 1875.

YEARS	DEPOSITS MADE	REPAYMENTS MADE
1870	Number. 14,389	1,515
	Amount. 1,082,158	287,213
1880	Number. 82,781	26,527
	Amount. 15,590,101	8,860,870
1890	Number. 1,079,699	22,903
	Amount. 82,000,601	51,765,375
1900	Number. 2,603,137	688,804
	Amount. 182,746,716	142,027,397
1902	Number. 2,640,507	850,585
	Amount. 217,772,187	193,268,404

YEARS	SAVINGS BOOKS EXISTING	RENT BOOKS EXISTING
1870	Number 4,416	»
	Amount 891,114	»
1880	Number 54,464	1,251
	Amount 30,176,984	3,662,100
1890	Number 514,595	5,590
	Amount 192,290,375	23,227,800
1900	Number 1,390,047	31,275
	Amount 503,665,348	125,509,800
1902	Number 1,582,442	49,244
	Amount 563,578,653	178,909,400

THE POST-OFFICE, DINANT.

Superannuation Funds.

The postal service of the superannuation funds has become operative on November 16th 1890, but reliable informations are wanting for the years previous to 1900.

YEARS	DEPOSITS MADE	REPAYMENTS MADE
1890	Number 8,953	"
	Amount 334 167	"
1900	Number 717,075	17 364
	Amount 3,205 804	930,876
1902	Number 959 703	22 718
	Amount 5,359 456	1,200,870

YEARS	BOOKS EXISTING	WARRANTS EXISTING
1900	Number 265,340	3,137
	Acquired rents . 4,739,738	Annual rents. . 911,177
1902	Number 468 288	4 000
	Acquired rents. . 5,225,990	Annual rents. . 1,106,955

Assurance Funds.

The postal service of the assurance funds is in operation since February 1st 1897.

YEARS	DEPOSITS MADE	PAYMENTS MADE
1900	Number 762	2
	Amount 239 592	458
1902	Number 3,257	3
	Amount 778,602	9,968

Aggregate receipts.

YEARS	ON ACCOUNT OF THE STATE	ON ACCOUNT OF PRIVATE PERSONS
1850	3,168,071	790,477
1860	4,822,990	5,296,610
1870	7,131,748	27,750,517
1880	11,557,073	348,767,273
1890	16,455,629	752,002,186
1900	25,248,482	1,343,950,288
1902	27,348,926	1,439,832,096

The working expenses of the postal service have reached in 1902 the figure of 14,347,090 francs.

TELEGRAPHS.

Belgium is the first country on the European continent where electric telegraphy has been placed at the disposal of the public.

By a decree of December 23th 1845, the Government authorised an English Company (Cooke & Wheatstone) to construct and to work, by way of experiment, a telegraphic line established alongside the railway between Brussels and Antwerp. This first line, 44 kilometres long and comprising 4 wires in two circuits, was completed towards the end of August 1846. Needle apparatus of Wheatstone & Cooke's system were installed at the stations of Brussels, Malines and Antwerp. The opening of the line to public correspondence was fixed on September 9th following.

In 1850 the Company which was the grantee, transferred to the State, for a sum of 60,000 francs, its entire working stock, including all privileges which it had secured and also the patent rights.

From this time, dates the progressive impulse given to telegraphy in Belgium. Adopting the conclusions of a thorough study entrusted to a special commission, the government laid before parliament the scheme of an Act which was voted on June 4th 1850. In pursuance of this Act, the Government was authorized to establish electric telegraphs on all the State railway lines. A first credit of 250,000 francs was appropriated to that effect.

From the year 1850 dates also the first international telegraphic arrangement, which was concluded between the Belgian and the Prussian administrations. According to this arrangement, both governments pledged

themselves to construct and keep in repair, electric lines alongside the railway between Berlin, Brussels, Antwerp and Ostend, *via* Aix-la-Chapelle. In addition the line was

THE POST-OFFICE, LOUVAIN.

to be protracted from Brussels to the French borders, to be connected with the Paris line.

On March 15th 1851, the offices of Brussels, Malines, Antwerp, Ghent, Ostend, Liege, Verviers and Quiévrain, were open to the public and connected with the offices of the german telegraphic union.

On April 20th of the same year, took place the opening of connexions between the Belgian and the French offices.

The telegraphic connexions between Belgium and the Netherlands were established on December 1st 1852.

Finally, on May 5th 1853, Belgium was directly connected with Great Britain by a sub-marine cable.

The following informations show the development which the telegraph has taken in Belgium since 1851, first year of working of this service by the State :—

	ON DECEMBER 31st	
	1851	1902
Length of lines in kilometres . . .	411	6,517
Development of wires in kilometres .	1,001	35,225
Number of offices open to the public.	10	2,050 (*)
Number of apparatus employed . . .	38	2,189 (**)
Cost of first establishment	230,000	12,756,074
<hr/>		
Number of private telegrams { inland.	5,877	3,302,234
{ inter- { issued and re-	6,034	2,833,103
{ national } ceived. . .	1,319	468 442
{ in transit . .		
Total number of private telegrams .	13,250	6,603,801
Number of letters and postcards delivered by the telegraph boys (***). .	—	1,938,319
Number of service telegrams . . .	5,661	7,648,300
Amount of receipts fr.	87,359	4,960,236
Amount of working expenses . . . »	52,617	5,121,028

(*) Of which 678 deposit offices. Although not connected with the system by telegraphic connexions, these offices receive the telegrams deposited by the public. They send these telegrams for transmission to the nearest telegraphic office.

(**) Whereof 104 telephonic apparatus used for transmission of telegrams.

(***) The telegraph takes charge of the *express* transmission of the said letters and cards since May 1st 1874. The number of these was : (a) in 1874, 11,470; (b) in 1875, 46,107.

One can also form an idea of the steady progression followed, during the last decennial period, by the movement of correspondence subject to postage, when comparing together the respective figures of 1893, 1898 and 1902.

DESIGNATION OF CORRESPONDENCE		1893	1898	1902
Private telegrams	inland	2,662,283	3,113,715	3,302,254
	inter-national	2,044,268	2,523,654	2,833,105
	issued and received. in transit.	371,132	481,742	468,442
	Total. . .	5,277,683	6,119,111	6,603,801
Letters and post-cards delivered by the telegraph messengers		945,142	1,564,638	1,958,319

In Belgium, private telegrams for inland service are at present subject to the following rates.

50 (fifty) centimes up to 15 words.

10 (ten) centimes more by indivisible series of :—

(a) 5 words, upwards of 15 and up to 50 ;

(b) 10 words above 50 words.

The fee is double for urgent telegrams. Thus :—

PER TELEGRAM	ORDINARY	URGENT
Up to 15 words.	Fr. 0 50	Fr. 1.00
From 16 to 20 words.	» 0 60	» 1.20
» 21 » 25 »	» 0 70	» 1.40
» 26 » 30 »	» 0 80	» 1 60
» 31 » 35 »	» 0 90	» 1 80
» 36 » 40 »	» 1 00	» 2 00
» 41 » 45 »	» 1 10	» 2 20
» 46 » 50 »	» 1 20	» 2 40
» 51 » 60 »	» 1 30	» 2 60
» 61 » 70 »	» 1 40	» 2 80
» 71 » 80 »	» 1 50	» 3 00
» 81 » 90 »	» 1 60	» 3 20
» 91 » 100 »	» 1 70	» 3 40
Of 200 »	» 2 70	» 5 40
» 300 »	» 3 70	» 7 40
» 400 »	» 4 70	» 9 40
» 500 »	» 5 70	» 11 40

From the point of view of the working conditions of the telegraph, the task of Belgium is especially difficult. It is easily conceived that in this country which has a very little extent and is furrowed in every direction by railroads, and where postal connexions are very rapid, the slightest delay in the interchange of telegrams may appear exaggerated.

Therefore the administration endeavours constantly to discover the means calculated to lessen the delays in the transmission of telegrams.

The numerous improvements applied to the equipment of the offices and the simplifications introduced in the service during the latter years, have produced the most happy results. The following informations are very suggestive in this respect, if one considers there exist in this little country 1372 telegraph offices, most of which are attended to by agents, who at the same time secure the railway or the postal service.

Year 1902

PRIVATE TELEGRAMS. INLAND SERVICE. TIME ELAPSED BETWEEN DEPOSITING
AND REACHING THE OFFICE OF DELIVERY.

Number of telegrams per cent transmitted within a delay of :—

	PER CENT.
1 to 15 minutes	69.47
16 » 30 »	24.83
31 » 45 »	4.48
45 » 60 »	0.95
Above one hour	0.27

TELEPHONES.

General considerations. The Act of June 11th 1883 has authorized the Belgian government to undertake itself or to concede the establishment and the working of the telephonic systems.

In pursuance of this Act, the State conceded the establishment and the working of the telephonic systems for Brussels, Liege, Antwerp, Ghent, Verviers, Charleroi, La Louvière, Louvain and Mons, in 1883; for Namur and Courtrai-Roulers in 1885; for Malines and Termonde-Alost in 1886.

In pursuance of the rights conferred by the Act of June 11th 1883, the State established and worked itself some telephonic systems having their respective centres in Ostend (1886), Bruges and Tournai (1890), Landen (1891), Chimay (1896), and Arlon (1897).

The government purchased back the telephonic concessions, in 1889, (Termonde-Alost); in 1893, (Brussels, Antwerp, Ghent, Liege-Verviers, Louvain, Charleroi); in 1894, (Mons and La Louvière); in 1895, (Namur); in 1896, (Courtrai-Roulers and Malines).

Since January 1st 1896, the public telephonic service is worked exclusively by the State Telegraphs Administration.

Local telephony. Towards the end of 1903 Belgium possessed 17 groups of telephonic workings so called local, comprising in the aggregate 133 systems attended to by an equal number of central offices.

Provide they pay the subscription fee, the subscribers of a local working or local group can correspond with each other without further costs.

Belgium possesses 110 public telephonic offices.

Telephony at great distance. Since the commencement, the Administration of telegraphs has reserved to itself the working of the telephony at great distance both in- and outland.

(a) Interurban telephony.

The interurban lines between groups, are constituted either by special circuits, or by existing telegraphic wires appropriated for telephonic use according to the system of Van Rysselberghe.

The inland interurban telephony was inaugurated on October 20th 1884, by connecting the telephonic systems of Brussels and of Antwerp. The connexions were extended in succession, and at present the internal interurban telephonic service is organized between all the systems. The fee is uniform and is of 1 franc up to 5 minutes, and of fr. 1.50 above 5 and up to 10 minutes.

(b) International telephony.

Numerous international telephonic connexions have been opened to the public; thus, the belgian systems correspond with a great number of french, german, dutch, english systems and with that of the Great Duchy of Luxemburg.

The first franco-belgian telephonic connexions, were opened on February 24th 1887, by operating the line Brussels-Paris. This line, the first which was created for international connexions at great distance, was a great success from the point of view of engineering science; and as for the commercial and financial side, it fulfilled all its promises to such extent that the single circuit of the commencement became soon insufficient, and at present four circuits, much occupied during the principal hours of the day, connect the belgian with the french capital.

The first telephonic connexions of Belgium with the other bordering countries have been inaugurated :—

With Germany, on October 15th 1895.

With the Netherlands, on November 1st 1895.

TELEPHONES CENTRAL-OFFICE, BRUSSELS.

With the Great Duchy of Luxemburg, on June 10th 1898.
With Great Britain, on June 8th 1903.

The anglo-belgian telephonic line is constituted by a submarine cable with 4 conductors 87 kilometres long, and land sections of brass-wire of 5 1/2 millimetres.

The total length of each of the two telephonic circuits Brussels-London is 394 kilometres.

Telegrams of subscribers. In Belgium the subscribers can transmit and receive their telegrams by telephone without being subject to any special fee on this account, beyond the telegraphic rates.

Telephonic information. In the inland service exists an organization of *telephonic information* having for object to invite a correspondent to put himself in telephonic communication with the sender of the information or with a third party mentioned.

Collection of correspondence at home. The subscribers are entitled to claim the calling at their residence or at any other address they indicate, of a telegraph messenger to collect either the telegrams for transmission, or ordinary postal correspondence to be sent by express.

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* * *

Statistical information. The figures below give a rather accurate idea of the considerable extension of the Belgian telephonic service.

In 1883 when the first concessions were granted by the government for the working of telephonic systems in the principal towns of the country, there were 7 central offices with which 2040 subscribers and 9 public offices were connected; when the State resumed their systems—January 1st 1893—the number of subscribers amounted to 7509, that of central offices to 33 and that of public offices to 42. At the expiration of the year 1903, the working utilized 133 central offices with 81,889 subscribers and 110 public offices.

Here are some comparative indications concerning the years 1893, 1891, 1902 :—

	1893	1898	1902
Systems in operation at the end of the year. . .	35	78	121
Subscriptions to the local service at the end of the year.	7,961	12,343	17,102
Public offices in operation at the end of the year .	51	93	108
Microphonic transmitters at the end of the year .	9,951	15,458	21,138
Development of the State wires for local telephony. kilom.	15,082	31,681	75,475
Development of the State wires for interurban telephony. . . . kilom.	9,932 (*)	10,672 (**)	13,750 (***)
Development of the State wires for international telephony. . . . kilom.	932	2,191	3,926
Number of inland inter-urban conversations . .	150,436	323,636	509,039
Number of international conversations.	62,315	99,515	182,956
Number of telegrams interchanged by telephone (gratuitous service). . .	946,168	1,277,826	1,564,568
Amount of receipts. . . .	1,845,011	3,371,807	4,967,099
Amount of expenditure .	1,508,035	2,506,714	4,185,036

Working Staff. The telegraphic and the telephonic services, both depend on the Telegraph Administration.

Though each service has its special agents, a great many of those connected with the telegraphic service lend their assistance to the telephonic service.

On the date of Decembre 31st 1902, the working

(*) Including 8408 kilom. of telegraphic wire appropriated to telephonic correspondence according to the system of Van Rysselberghe.

(**) Including 6808 kilom. under similar conditions.

(***) Including 6,654 kilom. under similar conditions.

staff of the Telegraphs Administration was composed of 10,974 agents divided as follows : —

	MALES	FEMALES
1° Officials and employés exclusively busy with the telegraph or the telephone	1,564	313
2° Subaltern officials (*) : servants, artisans, temporary artisans telephonists, female servants and carriers.	4,127	62
	<u>5,691</u>	<u>375</u>
	6,066	
3° Auxiliary staff : Agents of railways, posts, bridges and causeways, &c., who lend their assistance for telegraphic transmissions . .	4,684	224
Aggregate total . . .	<u>10,375</u>	<u>599</u>
	10,974	

(*) Not including the rather numerous agents who carry telegrams at home without this being their exclusive occupation.

FOREIGN OFFICE.

According to article 68 of the Constitution, it is the King who makes the treaties of peace, alliance and commerce. He imparts them to the Parliament, as soon as the interests

BARON DE FAVEREAU, minister of Foreign Office.

and the safety of the State allow it, and he adds to them the proper information.

The commercial treaties, and those which might burden

the state or bind Belgians individually, are only efficacious after having received the assent of Parliament.

The Foreign Office of Belgium includes following services :—

The General Secretary ;

The political Direction, which studies political affairs and has also in its province the service of Orders and Nobility ;

The Direction of litigious affairs and of the protocol ;

The Direction of commerce and consulates ;

The Direction of accounts ;

The Direction of chancery ;

Finally, the Direction of records, translation and library.

The general secretary of the Foreign Office is the eminent Baron Lambermont, minister of State, whose great merits and eminent services are known over the whole world. The part he has taken in the most remarkable international conferences of our time, and his intervention as supreme judge in the conflicts between different nations, have rendered his name illustrious abroad.

Above all Belgium will never forget his fortunate intervention in the negotiations which brought about in 1863 the liberation of the Scheldt.

In our days when, as has been said, « Diplomacy has become the intimate partner of commercial progress, » Belgian manufacturers and tradesmen highly appreciate the ever increasing services rendered to them by the Foreign Office and the diplomatic and consular bodies. The distant openings that Belgium has been obliged to seek, and the concessions it has obtained up to the Far East, could not have been secured without the perspicacious and attentive intervention of our Diplomacy helping the efforts and initiative of our August Sovereign.

The diplomatic body has been of late reinforced and the excellence of its recruitment guaranteed by a better system of examination at the entrance to this career.

A Royal Decree of the 25th of September 1896 has organized the consular service anew and has enabled it to assist and to guide more efficaciously the action of our tradesmen and manufacturers.

The Belgian Consular Staff includes *career consuls*, i. e. officials of Belgian nationality remunerated by the treasury, and *honorary consuls* recruited among the

notable residents of the town where the office is established, in preference Belgians.

At present it comprises 64 agents of the first category and 535 of the second.

The remunerated consular agents are classed, in the hierarchical order, as follows : general consuls, consuls and vice-consuls. The general consul sent into a country where there is no diplomatic agent can, besides his consular title, and if the general interest requires it, be invested of a diplomatic title during the time of his mission.

Unremunerated agents are classed in the following order : consuls, vice-consuls and consular agents. The qualification of general honorary consul can, if the general interest requires it, be given to tradesmen-consuls, but it in no way changes the character of the office, which remains a consulate.

The agents of both these categories having the rank of vice-consuls or one above are named by the King on the proposal of the Minister. The consular agents are named with the assent of the Minister, by the agents of a superior grade on whom they depend.

The consular body was formerly recruited on no determined system; the Minister was at liberty to choose the candidate who seemed to him the most capable of fulfilling this function.

The present organization has been elaborated according to the wishes of the Parliament and of the Superior Council of Industry and Trade.

By virtue of the rules on the matter, the titulars of the posts of vice-consuls are chosen amongst young men provided with diplomas of the superior degree in commercial and consular sciences delivered, either by the Superior Institute of Commerce of Antwerp or by the Belgian Universities, to doctors of laws, engineers, licentiates in commercial sciences, who have obtained this grade after two years' study in a public or private establishment.

Candidates not being provided with this diploma may exceptionnally obtain their admission in the career, if they possess certain other diplomas and have undergone, before a special jury, an examination of aptitude, the program of which is established by government.

Consuls are recruited among Vice-Consuls having at least six years of grade. They can also be chosen amidst

officials of the Direction of Trade and Consulates of the Foreign Office, having held during at least six years the functions of head-clerk or of a superior grade.

The functions of the consular agents can be classed under the following heads : trade and navigation, colonization and emigration, sanitary police, registration of births, deaths, marriages, etc. and notarial functions, litigious affairs, civil and repressive jurisdiction in countries out of Christendom.

Amidst the services rendered by these agents, one of the most useful consists in informing Belgian tradesmen and manufacturers of the state of affairs in foreign countries.

The practical information likely to interest men of business given by the consuls is centralized at the *Commercial Museum* of Brussels.

This establishment, which depends on the Foreign Office, keeps at the disposal of national trade numerous economical publications, documents concerning the important adjudications open in foreign countries, information of every kind concerning exterior trade, as well as collections of samples of home and foreign products.

The information sent by the consuls is put to public use according to its nature.

Information presenting a character of urgency is immediately transmitted by the consuls to the Foreign Office ; it appears, if necessary, in the *Commercial Bulletin*, a weekly paper issued by the Commercial Museum. That which interests particularly a determined person is communicated without delay to the latter and, that which has a confidential character is the object of a verbal transmission in the offices of the administration.

The General annual Reports are published in the *Consular Collection*.

Regular returns to Belgium are imposed on career agents in a view of general interest. It is at the Commercial Museum that, during their stay in the country, they receive Belgian manufacturers and tradesmen.

The Government has instituted travelling funds with a view of helping young Belgians who wish to perform abroad their commercial education. These subsidies have especially for object to favour the creation of Belgian houses of business in distant countries. They are

specially granted to young tradesmen, being pupils of Superior Institutes of Commerce and having received a diploma.

The *International Office for the publication of Tariffs* established by the international agreement of the 5th of July 1890, has its seat at Brussels and is presided by the General Director of Trade and Consulates at the Foreign Office.

It would be too long to enumerate all the conferences, meetings and congresses in which the Belgian Foreign Office has often taken a brilliant part.

Belgium has frequently been chosen as a seat for international meetings.

Here is the enumeration of those which have taken place from 1880 to 1903 :—

1880.—International congress for the study of questions concerning alcoholism, Brussels.

1880.—International congress of trade and industry, Brussels.

1885.—International congress of inland navigation, Brussels.

1885.—International congress of railways, Brussels.

1889.—International conference for the repression of slave trade.

1892.—International monetary conference, Brussels.

1894.—International congress for tariffs legislation and regulation of labour, Antwerp.

1897.—International congress for Sunday rest, Brussels.

—International congress for cheap dwellings, Brussels.

International congress of labour accidents, Brussels;

International congress of legal medicine, Brussels;

International colonial congress, Brussels;

International congress against the abuse of alcoholic beverages, Brussels;

International congress of trade and industry, Brussels;

International congress concerning the hygienic and medical service of railways and navigation, Brussels;

International congress for labour legislation, Brussels;

International conference for the protection of industrial property, Brussels.

1898. International congress of commercial education, Antwerp;

International sugar bounties conference, Brussels;
 International navigation congress, Brussels;
 International congress of tariffs regulation and labour
 legislation, Antwerp;
 International congress of public art, Brussels.

1899.—International conference for the revision of the
 regulations on spirits in Africa, Brussels;

International congress of horticultural studies, Ghent;

International medical conference, Brussels;

International congress of the middle-classes, Antwerp;

International congress of physicians of insurance
 companies, Brussels;

1900.—International conference for the protection of
 industrial property, Brussels.

1901.—International congress of the middle-classes,
 Namur.

1901-1902.—International sugar bounties conference,
 Brussels.

1902.—International congress of trade and industry,
 Ostend;

International medical conference, Brussels;

International conference for the unification of the for-
 mulæ of heroic remedies, Brussels.

1903.—International congress of hygiene and demo-
 graphy, Brussels;

International dairy congress, Brussels.

BELGIAN MISSIONS.

Belgium has produced, since the middle ages, especially in the **xixth** century, numerous missionaries who distin-

FATHER P.-J. DESMET.

guished themselves by their boldness in establishing missions in the four quarters of the world and by their wisdom in administering them.

François Xavier, the apostle of India, highly appreciated their evangelical zeal and their solid qualities of energy and perseverance. « *Da mihi Belgas* » (give me Belgians), wrote he in asking for collaborators for his missions in India and Japan.

At the beginning of the xixth century, the Belgians participated at the evangelization of the immense territories of United States. Let us mention, among those who devoted themselves particularly to the American mission,

THE CHAPEL OF HOLY BLOOD, BRUGES.

two Belgian Jesuits, Charles Nerinckx, who, started in 1804, was attached at the Kentucky mission, and Pierre-Jean Desmet who, landed in 1821, became the apostle of the Rocky Mountains and Oregon. America did not lose the remembrance of those virtuous men. They have especially faithfully kept the memory of Father Desmet, as being that of a highly-gifted man who is an honour to his country. The town of Termonde, in Belgium, has erected a statue to his memory.

The *American Seminary of Louvain* was founded in 1857 by the Right Rev. J. Spalding, then bishop of Louisville (Kentucky) and by the Right Rev. Lefebvre, from Roulers, administrator of the diocese of Detroit (Michigan); that institution has for object the recruitment and instruction of young priests for the secular clergy of United States. The students, American and Belgian men, are admitted there after humanities and philosophy. Since its establishment this seminary has furnished the dioceses and mis-

INSIDE OF THE CHAPEL OF HOLY BLOOD, BRUGES.

sions in the United States with 650 priests of which 500 are still in life. We reckon among them 130 Belgians, of which 5 are Prelates.

The *Apostolical School of Turnhout*, established in 1872 and directed by the Fathers of the Jesus Company, has also for object the instruction and formation of young priests for foreign missions.

During the last ten years, 102 young men left the school (63 of which were Belgians).

The Belgian missionaries go not only to America, but to England, to the northern countries of Europe, to Southern Russia and Caucasian Mountains, the Grecian Archipelago, Portugal, Asia, till the banks of the Ganges, to Africa and to the far distant islands of Oceania.

As well as friars and priests, Belgium sends on every point of the world nuns and sisters of every order. They visit the remotest countries and devote themselves to the education of childhood, to the care of patients in hospitals and lazarets, to the relief of distress of every kind.

It should be too long to draw a complete table of Belgian missions in foreign countries. Let us, however, mention the following ones :—

The *Apostolical Vicariate of the Congo Free State*, founded in 1888 and maintained by the Congregation of Scheut, near Brussels. It includes the whole territory of the State, with the exception of the detached missions of Haut-Kassaï, Kwango, Ouelle, Tanganika, Stanley-Falls and Bas-Congo, granted to other religious orders. The Belgian missionaries have thus taken a large part in the civilizing work of Congo.

The missions of Danish and English *West Indies*, of *Canada* and of *Brazil*.

In India, the missions of *Pendjab*, of *Malabar* and of *Bengal*. The latter includes two colleges directed by the Jesuits Fathers and agreed by the Calcutta University.

In Ceylon, the pontifical seminary of *Kandy* and the mission of Galle.

In China, the missions of *Houpe*, of *Mongoly*, of *Kan-Su* and of *Hi-ou-Kouldja*.

In Oceania, the *Apostolical Vicariate of Sandwich Islands*, where the Father Damien rendered himself illustrious. That admirable apostle of the lepers of Molokai, died victim of his zeal and exalted devotion. A monument has been erected to that glorious martyr, at Louvain.

ARMY.

According to the Constitution, the King commands forces both by land and sea; he confers the grades in the army and confers also the military orders in accordance with the provisions of the law.

The method of recruiting the army is determined by the law, which regulates also the promotion, the rights and duties of military men. The contingent of the army is voted every year. The law which fixes this is in force for one year only, unless re-enacted.

The organization and powers of gendarmery are the object of a special law.

The War Office includes six General Directions :—

The Minister's Office and the Secretary's Office;

The General Direction of military operations and army instruction;

The General Direction of personnel and recruitment;

The General Direction of artillery material;

The General Direction of engineers' material;

The Military Cartographical Institute;

The General Direction of Administration and Storing Service.

The war budget for the year 1903 was fixed as follows :—

1° For the ordinary expenses : fr. 49,915,415.72

2° » exceptional » » 5,393,296.61

Fr. 55,308,712.33

The gendarmery budget for the same year amounted to fr. 8,598,711.99.

Recruitment of the Army.

The recruitment of the army is secured by enlisting of volunteers.

Yearly levies make up, if necessary, the insufficiency of enlisting.

The duration of the militia term is eight years in active army, followed by five years in the reserve. It begins, for militia men and substitutes, the 1st October of the year of their incorporation; for the volunteers of the contingent and for the volunteers with bounty, the 1st October which follows their enlisting.

The militia-man can exonerate himself from the service by substitution, the price of which is fixed every year by a Royal Decree and may not exceed 1800 francs.

The law determines the dispenses and exemptions.

The drawing lots is used to rule the order following which the inscribed men have to make part of the yearly contingent. It takes place prior to the medical examination.

The militia-men, the volunteers with bounty, the substitutes and the volunteers of the contingent, are sent in illimited furlough when they have effectively served during the following terms :—

- Infantry : 20 months;
- Cavalry and horse artillery : 36 months;
- Field artillery and train : 28 months;
- Fortress artillery and special artillery companies : 22 months;
- Engineers : 22 months;
- Bataillon of administration : 24 months.

Remuneration in point of militia.

The military men of an inferior rank, except the volunteers with bounty, receive, besides their ordinary allowance, a monthly indemnity fixed as follows :—

- 1° Militia-men of foot troops : 25 francs;
- 2° Militia-men of horse troops : 30 francs;
- 3° Volunteers of the contingent : 30 francs;

4° Volunteers of career (from the age of 18) : 35 francs ;

Reenlisted { Soldiers : 35 francs ;
 { Corporals : 40 francs ;
 { Non-commissioned officers : 50 francs.

For what concerns the military men of the 4 first classes, a sum of 15 francs is previously deducted from that indemnity in order to be given to the father or to the

STATUE OF GODEFROID DE BOUILLON, BRUSSELS.

mother, or to the nearest relative of the soldier, as the case may be.

Provided that if the interested man is married, the sum of 15 francs is given to his wife and, if he is a widower or a divorced man with children, it is paid to the persons who have the charge of them.

The rest of the remuneration indemnity is deposited in the General Savings Bank. From the funds so deposited, a sum of 15 francs is yearly deducted to be transferred

to the General Superannuation Bank under the guarantee of the State; owing to that transfer the depositors are entitled to the bonuses provided by the law on the old age pensions.

A part of the remuneration is paid every month to the volunteers of career and to the re-enlisted military men.

The military men married and fathers of family, who are recalled to the active service for the mobilization of the army or in special circumstances, receive a supplementary and daily indemnity of 50 centimes or of 1 franc, according to the case of having one or more children; that sum is paid into their own hands.

The remuneration in point of militia (Law of the 21st of March 1902) figures on the Budget of the Public Debt. The Credit appropriated for that purpose was in 1903 of 14,031,000 francs.

The militia law says that, in every department of the civil service, a Royal Decree determines the kind of places for which the preference is given :

A) To non-commissioned officers, brigadiers and corporals having gone through at least eight years of active service.

B) To volunteers and ancient volunteers.

With equal merit in the same class, the preference is given to the candidate who has accomplished the longest active service in the army.

The preference never dispenses with the conditions of admission. An exception is only made for the limit of age, which may be exceeded by a number of years to be determined for every situation.

The army on peace footing includes :—

A General Staff; a Staff corps; a Staff of Provinces and Places; administrative, sanitary and veterinary Services; at last Infantry, Cavalry, Artillery, Engineers and Train troops.

The Infantry includes :

1 regiment of Carabineers;

1 » » Grenadiers;

3 » » Chasseurs;

14 regiments of the line.

The regiment of Carabineers has 113 officers and

1685 men; each of the other Infantry regiments has 87 officers and 1,182 men.

The Cavalry includes : 2 regiments of Chasseurs; 2 of Guides; 4 of Lancers.

The effective force of each Cavalry regiment is 38 officers, 671 men and 616 troop horses.

The Artillery is divided into :—

A) Special Services including 72 officers and 117 men.

B) The Field Artillery including 4 regiments. The 1st and 3rd regiments have 52 officers, 132 men, 130 saddlehorses and 320 draught horses; the 2nd and 4th regiments have 62 officers, 981 men, 244 saddlehorses and 320 draught horses.

C) The Fortress Artillery of fortified places of Antwerp, Liège and Namur which includes :

Antwerp 132 officers, 1771 men

Liege 50 » 940 »

Namur 39 » 711 »

There are three special companies of Artillery : 1 company of artificers, 1 company of workmen, 1 company of armourers.

The Train includes a regiment formed of a staff, seven companies and a « dépôt ».

The Engineers Corps includes a Special Staff, a regiment and five special companies : telegraphists, torpedos and artificers, railway corps, pontooners, mechanics and balloonists.

THE BELFRY OF THE HALLES, BRUGES.

The peace-strength of the Belgian army is : —

3409 officers; 43,030 men; 1726 officer horses; 5742 saddle horses (troop); 1587 draught horses.

On war footing, the Belgian military forces are divided, at the mobilization, into a field Army and fortress troops.

The field Army has an effective force of 100,072 men (2513 officers and assimilated officers and 97,559 men), 21,547 horses and 2060 carriages.

The fortress troops are composed of 79,357 men, officers being included; these troops are affected to the constitution of the garrisons of Antwerp, Liege, Namur, of the fort of Diest, the fort of Huy, as well as to the Depôts.

The gendarmery troops detached to the field Army and to the fortress troops being deducted, there remain 1855 gendarmes for the territorial services.

The Belgian army has a totally effective force of 181,262 men, including officers.

Defensive System of Belgium.

The defensive system of Belgium is composed by the places of Antwerp, Termonde, Liege and Namur.

The place of Antwerp constitutes the reduct of the national defence. The construction of that place began in 1859, according to the designs of Lieutenant General Brialmont, the illustrious military engineer, vulgarizer of the polygonal typed fortification. It is composed of a continuous enceinte and of two lines of detached forts.

The place of Termonde constitutes a double bridge-head on the Scheldt.

The places of Liege and Namur commands the valley of the Meuse. These places, bridge-heads for the field Army, are constituted by a line of detached forts. These forts constructed in 1889, are in beton and armed with guns in coupolas.

General Instruction of the Army.

A « Improvement Committee for the instruction establishments of the Army » is established at the war office and is composed of ten members, at the most, and includes superior officers of each kind of arms, the officer com-

manding the War School, and the officer commanding the Military School.

That committee is consulted on the propositions of the officers commanding the war and military schools. It sends every year to the minister of war a report on the progress of studies and teaching in the army.

The Belgian army possesses the followings instruction establishments :—

The *War School*, the object of which is to spread the superior military instruction in the army and to secure the recruitment of staff officers.

The *Military School*, established at Brussels, and

THE LION OF WATERLOO.

destined to form Infantry, Cavalry, Artillery and Engineers' officers.

The admission of pupils is granted by means of competitions open to military as well as to civil young men.

The *Application and Improvement School for Infantry*, established at the camp of Beverloo, the aim of which is to complete the practical professional education of the newly named sub-lieutenants and to proceed to practical tests concerning armament, shooting, tactics, equipment, &c...

The *Riding School* of Ypres; its aim is to improve

officers, non-commissioned officers and brigadiers of horse troops; to form cavalry instructors: to complete the instruction of newly named veterinary surgeons' assistants; at last, to form farriers for the army services.

The *Cadets School* of Namur. That establishment gives a middle and military instruction to the sons of officers of active army who wish to enter the career of officer or of military physician, chemist or veterinary surgeon.

The admission ages are from 11 to 16; until the age of 16 the cadets are submitted to no obligation toward the State; when they reach their 16th year those who are acknowledged able-bodied may sign a volunteer engagement for a militia term; the unable-bodied young men are sent back to their families.

The *School of Army's Pupils*, established at Alost, gives to the legitimate sons of military men or of officials of an administration connected with the war office, the military education and a sufficient instruction to render them able to make part of the inferior staff of the army.

When they reach the age of 16, the pupils sign an engagement for a militia term; when leaving the school, the pupils, volunteers of career, are sent in a regiment as corporal, brigadier or soldier, according to their merit.

The *Gymnastics and Fencing Normal School*, established at Etterbeek (Brussels), forms fencing masters and fencing masters' assistants.

Each regiment detaches every two years a non-commissioned officer in that school in order to follow the lessons.

The section of gymnastics includes three successive courses of a length of three months each. Every regiment sends at each course a non-commissioned officer or a corporal or brigadier candidate non-commissioned officer.

The *Regimental Schools* are placed under the superior direction of the Colonel. These schools give, to the soldiers admitted to follow their courses, the military education and the necessary instruction to allow them to make part of the inferior staff of the army.

Those institutions facilitate also the access of Military School for young men having a general instruction sufficiently developed, as well as the indispensable education and qualities required to seek for the position of officer.

The evening courses, organized in the regiments, have the same object. The lessons are given on the six days of the week, at the rate of 1 1/2 hour per day.

The frequentation of them is obligatory : 1° for the non-commissioned officers and corporals aged less than thirty years, when their instruction is insufficient for their grade ; 2° for the non-commissioned officers candidates sub-lieutenants.

These lessons secure also to every pupil who wishes a sufficient knowledge to make him able to obtain, when he leaves the regiment, a secondary place in the civil service.

Courses for illiterate soldiers. According to the article 107 of the militia law, courses for unlettered soldiers are instituted in the regiments. The frequentation of them is obligatory for every soldier who can neither read nor write.

The lessons are given five times a week, from the 1st of October to the 30th of April ; the teaching includes the usual notions of writing, reading and arithmetic.

During the first period of instruction the militia men of the new classes are not called to these lessons which, moreover, are suspended during general inspections, manœuvres and shooting periods.

Courses of cultivation of forests. Lessons of cultivation of forests are given in French at Bouillon and in Flamish at Diest by forester agents of the State. The courses are open from the first Tuesday of October to the 30th of April. The yearly number of intended forest-keepers is 25 at Bouillon and 15 at Diest. The admission is ruled by a competition (in proportion to the effective force of different arms).

Agronomy courses. The elementary lessons of agronomy take place during the months of December, January, February, March, at the rate of two lessons of an hour per week.

All military men who request it, are allowed to attend the courses ; but the frequentation of those lessons gives no right to any exemption of service.

The theoretical teaching includes an average of 20 lessons and comprises the development of the programme concerning the agronomy courses for adult men.

Measures taken for the intellectual and moral develop-

ment of soldiers. — In order to develop the intellectual culture of the soldier, the colonels and the officers commanding the detachments have as duty to favour the creation of reading-rooms in the barracks; they choose with care the books, papers and magazines able to give to the troop useful and agreeable readings.

Besides, in order to induce the soldier to saving, there are posted, in the local of every troop unity, advertisements concerning the advantages offered by the affiliation to the General Savings and Superannuation Bank as well as to friendly societies.

During the talks that they have with their soldiers in order to increase their sentiments of civic and military duties, the officers commanding companies, squadrons, or batteries explain them the social institutions created by the laws with a view to improve the comfort of operative classes and show them how to acquire all the advantages of those institutions.

They particularly insist on the benefits of mutuality and of life insurance and show how the military men can utilize their remuneration in order to constitute to themselves, in the future, a determined pension and to become the owner of a small house under the auspices of a « Patronage Committee of workmen's dwellings. »

The Government has also begun in the army the struggle against alcoholism.

The sale of spirits is forbidden in barracks and on manœuvre fields. Besides, the canteens are gradually replaced by mess placed under the immediate control of military chiefs and where the soldier can buy as cheap as possible hygienic drinks. The men find there also recreative games which keep them from public-houses.

The officers have as a duty to show frequently their men the dangers of the abuse of alcoholic drinks. Besides, the physicians, in periodical conferences, point out the physiological perturbations resulting from the immoderate use of strong liquors.

All facilities are granted to the soldiers to allow them to perform their religious duties.

The almonry service is secured, in garrisons by chaplains and chaplain's assistants or agreed priests.

University Companies. The military men can be

THE ROYAL GUN-FOUNDRY, AT LIEGE.

admitted in the said University Companies, when they wish to attend, as regular pupils, the courses of superior education.

The different military services are ruled in such a manner that the students are only exceptionnally disturbed from the lessons.

The students of these companies lodge in the barracks where private rooms and studies are destined to them. Those who obtain the diploma of Chemist or of Docteur in law may be authorized to keep their terms.

Special Institutions.

I. *The Military Cartographical Institute* forms the fifth General direction of the War Office.

The Provisory Government, by a decree of the 26th of January 1831, created the *War Depot* for the documents of military cartography. A Royal Decree of July 30th 1874, transformed that institution and created the *Military Cartographical Institute*, the object of which is the publication and keeping in order of chorographical and topographical maps.

The technical and topographical works belong to the military staff. The civil staff is affected to execution of maps, engraving, lithography, design, printing, &c...

The publications of the Institute obtained the highest rewards at the following exhibitions : Paris (1867 and 1878); Vienna (1873); Santiago (1875-1876); Sydney (1879); Melbourne (1880-1881); Venise (1881); Calcutta (1883-1884); New-Orleans (1884); Ghent (1880); Brussels (1880, 1888 and 1897); Antwerp (1885, 1890, 1894 and 1902).

II. The special services of Artillery includes the technical establishments charged with the manufacture of war equipment, arms, ammunition, &c., destined to the defence of the country.

These establishments are :—

1° *The Royal Gun Foundry*, established at Liege to manufacture and repair guns and projectiles as well as gun-carriages and other metallic objects used by the Artillery.

A technical service works there and occupies itself with the questions concerning the electrical service of forts.

THE PYROTECHNICS SCHOOL, AT ANTWERP.

Special lessons are organized with a view to instruct stokers, mechanics and electricians intended to the service of the electrical installations in iron-clad forts.

At last, a certain number of fortress artillery men are trained every year to execute the ordinary repairing of material.

2° The *State Arm Manufacture*, also at Liege, is at the same time an establishment of instruction and a manufacture.

They are charged with the manufacture of small arms as well as of their spare pieces, with the most important reparings and with the professional instruction of the staff attached to the armament service in troop bodies.

3° The *Pyrotechnics School*, established at Antwerp, is charged with the manufacture of ammunitions for small fire arms and for guns (projectiles excluded) and of the diverse artifices used by the Artillery.

A laboratory is connected with it for the examination and the analysis of raw material destined to be worked up in the different services of the Artillery, as well as of the war powders coming from private industry.

Theoretical and practical lessons on the manufacture of artifices (for non-commissioned officers of the Artillery) are yearly organized at the Pyrotechnics School.

Besides, a course of Chemistry and Physics is there given to officers as well as to candidates officers.

4° The *Arsenal of Construction*, the seat of which is also at Antwerp, is charged with the construction and repairing of carriages, armament, spare pieces, and accessories for the carriage train of the field army and of fortress material, with the manufacture of harness for the Artillery and Train and with the formation of mechanics for the batteries.

III. The *Establishments of the alimentary services* include :—

A mill at Antwerp.

A preserve manufacture at Antwerp.

Bakeries and butcheries in the greater number of garrison places.

Forage store-houses.

CIVIC GUARD.

Since the establishment of its independence in 1830, Belgium has a *Civic Guard*, the object of which is to watch over the maintaining of order and over the observance of laws; it must also help the army in the defence of the territory.

The Civic Guard is composed of all the able-bodied citizens aged from 21 to 40 able to fit themselves out at their own expense; it includes also a great number of volunteers.

The citizens aged from 21 to 32 form the first ban, those ones aged from 32 to 40 form the second ban. The Guard is active in all communes having more than 10,000 inhabitants, as well as in certain industrial centres. It is perfectly armed and equipped. It is non-active in the other localities and receives arms only in case of necessity.

The State furnishes the armament, equipment and ammunition.

Organization.

All the Civic Guards of the country are divided in four superior commandements including the Guards of two or three provinces. The superior commandants are generals.

There is a chief of the Guard in every commune.

In every commune the active Guard is organized in companies, bataillons, or regiment of infantry, according to the importance of the localities.

The non-active Guard is organized in companies or platoons in every commune. It may be called out to active service by a Royal Decree.

Volunteers Bodies.

The volunteers form the bodies of : Artillery, Foot Chasseurs, Cavalry and Firemen.

The total effective force of the active Guard is 41,000 men, among which are 10,000 volunteers.

The officers, non-commissioned officers and corporals of every company, squadron or battery are elected by the guards among those who possess a diploma of knowledge. All other officers are named by the King.

Instruction.

The recruits have thirty instruction sittings. The first ban has, every year, twelve exercises; the second, five. The chiefs of volunteers bodies may prescribe supplementary and obligatory exercises.

During the first four years of their enlisting the guards of the first ban can be called for exercises and manœuvres for a period of five days. They are particularly trained to shooting in the stands and at the camp of Beverloo.

The artillery volunteers are trained to gun shooting at the polygon of Brasschaet.

The greatest part of our towns dispose of stands allowing the shooting with war arms at distances varying from 200 to 600 metres. Each regiment possess also numerous reduced shooting galleries.

A great National Shooting Competition is organized, every year, at Brussels for all the Civic Guards of the Kingdom.

The town of Spa establishes in the plains of Malchamps a shooting field to great distances; they intend to organize there in 1905, a *great international match*, on the occasion of the 75th anniversary of our National Independence, and to invite the most celebrated shooters of the world.

Requisitions.

The Civic Guard of each locality can always be called under arms for the maintaining of order and public peace,

either by the Burgomaster or by the Governor of the province, or by the Minister of Home-Department.

It can also be required in order to replace or supply, for the place service, the garrison momentarily absent or insufficient.

Discipline.

Every guard who is guilty either of an infraction to the law or regulations, or of an indiscipline or insubordination act is under the jurisdiction of the Council of Discipline. This council is composed of a judge of the peace, president, two subaltern officers, a non-commissioned officer, a corporal or brigadier, members.

The Council of Discipline may pronounce, separately or cumulatively, fine from 1 to 25 francs and imprisonment from 1 to 7 days.

In case of a second or subsequent offence the penalty may be increased to the double.

Officers are arraigned before a Council of Inquiry composed of the superior Commandant as president, and of four officers of a grade equal or superior to that of the accused officer.

The non-active guards who do not fulfil their obligations are prosecuted and judged as in point of policy.

GENDARMERY.

The Gendarmery watches over the public safety, insures the maintaining of order and the execution of laws.

Its powers extend on the whole territory and are particularly destined to the safety of the country and communication ways.

The Gendarmery is a part of the army.

It depends on the War Office for what concerns material and discipline, on the ministry of Justice for what concerns the maintaining of public order, the exercise of general and judiciary policy.

The places of gendarmes are given, in preference, to military men having performed their normal military service or belonging to the reserve or definitively liberated from service.

The Gendarmery is composed of three divisions including each three companies.

The company includes a variable number of brigades spread on the territory and charged with the supervision of a certain number of communes, the groupment of which forms a military canton.

The force of brigades is, generally, of one non-commissioned officer and four foot or horse gendarmes.

There is, besides, a moveable and instruction squadron where the newly enlisted gendarmes are educated.

The effective force of Gendarmery amounts to :—

67 officers.

1760 foot gendarmes.

1318 horse gendarmes.

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